10. EDUCATIONAL AND CLINICAL APPLICATIONS

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Sources of expert advice: A comparison of peer-reviewed advice from the literature with that from an automated performance support system

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The treatment of aggression, self-injury, and property destruction is difficult for clinicians. To ease their burden, clinicians may receive help in developing treatments from the scientific literature or from the new automated performance support systems. This study compares the treatment suggestions offered by these two sources of expert advice across 30 clients. Four clinicians obtained consultations from the Mental Retardation-Expert (MR-E), an automated performance support system, for client descriptions abstracted from the literature. The results indicated that MR-E, when compared with the literature, offered more positive proactive treatment suggestions, relied more on accelerative rather than decelerative approaches, and offered more treatments from which the clinician could choose.

Despite years of research and treatment, severe inappropriate behaviors, such as aggression, self-injury, and property destruction, continue to be a significant problem in individuals with mental retardation or developmental disabilities. If the frequency of these behaviors were reduced, more individuals could move from residential facilities into the community and fewer individuals would enter such facilities in the first place. To address this problem, there has been increasing emphasis on the selection and development of effective and appropriate treatments through the use of functional assessment (Carr, Robinson, & Palumbo, 1990).

Functional assessment consists of an attempt to identify the stimuli that maintain or control undesirable behaviors. It comprises various techniques, including direct

behavioral observations in real-world settings (Donnellan, Mirenda, Mesaros, & Fassbender, 1984), staff-completed questionnaires (Durand, 1990), and analogue or experimental manipulation of variables thought to control a target behavior (Axelrod, 1987; Donnellan et al., 1984; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982). Once the controlling stimuli are identified, accelerative treatments can replace undesirable behaviors with functionally equivalent desirable skills. Such positive treatments may minimize the need for more intrusive decelerative interventions (Axelrod, 1987; Durand, 1987) and increase treatment generalization to new situations (Durand, 1990).

To assist clinicians to understand functional relationships and thereby create more positive and effective interventions, we have developed an automated performance support system, the Mental Retardation-Expert (MR-E, pronounced "Murry"). It supports master's-level clinicians who work with aggressive, destructive, or self-injurious mentally retarded or developmentally disabled persons. MR-E contains a variety of interrelated components. It models behavioral treatment consultations with expert clinicians on severe undesirable behaviors, provides information from the current scientific literature, and helps clinicians translate expert and scientific information into treatment protocols. The system was

The authors gratefully acknowledge the editorial assistance of Linda Sage and the help of Stephanie Patag. The Mental Retardation-Expert was partially supported by a grant from the National Institute of Mental Health (5 R29 MH43439). The opinions expressed in this paper are those of the authors, and no official endorsement by any agency should be inferred. B.B.G. is currently employed at Tehran University, Tehran, Iran. Correspondence should be addressed to M. G. Hile, Department of Psychology and Neurology, University of Missouri-Columbia at the Missouri Institute of Mental Health, 5247 Fyler Avenue, St. Louis, MO 63139 (e-mail: mimbmh@mizzou1.missouri.edu).

developed by modeling a human expert's consultation approach and has been shown to provide advice equivalent to that individual's (Hile, Campbell, & Ghobary, 1994). MR-E asks the clinician user a series of questions to identify which of 21 functional hypotheses might explain a client's behavior. On the basis of these responses, MR-E expands its questioning to explore the parameters of each of the possible hypotheses. The user's responses are used to construct a set of treatment recommendations specific to the individual client or, if necessary, to recommend specific functional assessment procedures to clarify difficult diagnostic questions (for a full description of MR-E, see Hile & Desrochers, 1994). MR-E's primary purpose is to provide clinicians with up-to-date expert advice, information, and treatment suggestions when and where they are needed. The project's ultimate goal is to increase the independence of developmentally disabled or mentally retarded persons with significant problem behaviors.

A more traditional source of clinical advice is the scientific literature, from which clinicians get new ideas, find appropriate treatment paradigms, and learn about what should and should not be included in treatments. When faced with new or difficult problems, for example, clinicians may conduct literature searches to identify similar situations. If they find procedures that seem appropriate or descriptions of clients that match their clients, they may attempt to duplicate the suggestions offered in the articles. So clinicians rely on this peer-reviewed advice for expert assistance with difficult problems.

We wanted to elucidate the relationship between the advice offered by MR-E and literature-based expert assistance in order to examine the validity of the performance support system. In this paper, we compare MR-E's treatment suggestions with those offered in a series of published articles. We compared the two sources of advice at three levels: the overall focus of the intervention, the behavioral principles behind the intervention, and the intervention itself.

We first asked, "Does the intervention seek to manage the occurrence of the problem behavior or does it seek to treat it?" (Gardner & Cole, 1987). Management approaches are designed to control the occurrence or intensity of a behavior without fundamentally altering it. They may be proactive, being carried out before the behavior occurs (e.g., eliminating the instigating conditions), or reactive, occurring during or after the behavior (e.g., redirecting the individual to another task). In contrast, treatment approaches are designed to effect an enduring change in the behavior itself, with proactive approaches occurring before the behavior (e.g., strengthening functionally equivalent alternative behaviors) and reactive approaches occurring during or after the behavior (e.g., removing the functionality by extinction).

At the second level, we analyzed the basic behavioral principle(s) used in the intervention, including positive reinforcement, negative reinforcement, positive punishment, negative punishment, and extinction. Positive reinforcement involves rewarding an individual with a de-

sired object for displaying an appropriate behavior or not displaying a problem behavior. Negative reinforcement interventions are exemplified by allowing an individual to escape from a disliked task on request. Positive punishment involves the application of a negative stimulus following the occurrence of a particular behavior, as when a person who hits a peer is physically restrained. Negative punishment, in contrast, removes a positive stimulus when a person behaves in an undesirable manner. Removing privileges after the destruction of clothing is an example. Extinction, or lack of reinforcement of a problem behavior, would occur when a person turns away for a few moments from an individual who has just engaged in a self-injurious behavior. More than one of these five principles may contribute to any specific treatment plan.

To compare specific interventions, our third level of analysis examined the use of differential reinforcement, skill development, prompts, etc. We were therefore able to compare and contrast specific treatments in terms frequently used in the scientific literature.

At each level of the analysis, we asked, "Does MR-E provide the same advice as the scientific literature does?" "If not, what characterizes the differences?" "What are the implications of those differences?" The answers begin to address the question of the validity of the expert assistance offered by MR-E in comparison with the more traditional source embodied in published literature.

METHOD

We provided four doctoral-level clinicians (2 women and 2 men from three different institutions) with 30 case descriptions. Abstracted from the scientific literature, each description included a functional assessment for the aggressive behavior exhibited by a person with mental retardation. The one- or two-page abstraction included passages from the published article and a description and history of the client. The undesirable behavior was described and functional assessment data were included, although graphs and tables were not reproduced. No information on treatment was provided.

The clinicians, whose direct clinical and supervisory experience ranged from less than 1 year to more than 10 years, obtained MR-E consultations (software Version 0.22) for the 30 cases. They were instructed to "read the case and try to place yourself in the role of the clinician while answering the questions. Try to stay as close to the available data as possible though you may make some educated guesses and hypotheses." During a consultation, the clinician and MR-E interact, in a question and answer format, to develop a set of case-specific functional hypotheses. At the end of each consultation, MR-E's treatment recommendations were printed in a report.

To compare MR-E's recommendations with those offered in the published articles, two of the authors (Hile and Campbell) independently rated each consultation report and article, using the same scale. The reports were produced with the same printer and then duplicated to prevent identification of individual clinicians. They were randomly ordered and then independently and blindly rated on three separate levels: management/treatment approaches, general principles, and specific interventions.¹ The first level addressed the inclusion of proactive and reactive management and treatment approaches (Gardner & Cole, 1987). The second level indicated the presence or absence of the five major behavioral principles (viz., positive reinforcement, negative reinforcement, positive punishment, negative punishment, and extinction) in the

recommended treatments. The third examined the presence or absence of 45 specific treatment interventions (Hile & Vatterott, 1991), ranging from relatively nonintrusive approaches, such as environmental change, skill development, and desensitization, to more intrusive approaches, such as physical restraint and exclusionary time out.

In evaluating the treatment suggestions that MR-E generated, we rated only the suggestions recommended by the system. MR-E takes a conservative approach to suppressive treatments such as time out, physical restraint, and overcorrection, recommending them only if a clinician has found a presumed function for an undesirable behavior, if a client has alternative prosocial skills that serve the same function, and if the setting in which treatment is to be conducted permits such methods. If these conditions are met, MR-E prompts a clinician to select which suppressive treatment, if any, he/she wishes to consider from a list of treatments specifically available at that setting. It suggests that the treatment be used to reduce the probability of the undesirable behavior while new prosocial behaviors are being strengthened and that it be gradually discontinued as positive controls increase. Because suppressive treatments are (1) not specifically designed to treat the undesirable behavior and (2) selected by the clinician and setting, rather than by MR-E, such recommendations were not coded in our ratings.

RESULTS

As a result of the blind ratings, 147 different sets of treatment ratings were obtained: 30 cases from the literature plus the same 30 cases evaluated by four clinicians equals 150 ratings, but one clinician failed to complete 3 cases. Interobserver reliability (IOR) for the two authors' independent classification of the 147 ratings was computed by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100 (Kazdin, 1982, p. 54). The resulting IORs were 91% for management/treatment, 93% for the major behavioral principles, and 96% for the specific interventions, indicating strong agreement between the two raters. All discrepancies in ratings were resolved through consensus before the data were analyzed. Because of the high level of agreement between clinicians found in a previous study (Hile, Campbell, Ghobary, & Desrochers, 1994), the analyses reported below averaged the data across all four clinicians.

We first analyzed the relationship between MR-E's recommendations and those in the published reports. Across the 30 clients, there were modest agreements for management/treatment approaches (IOR = 79.31%), major behavioral principles (IOR = 71.01%), and specific treatments (IOR = 44.52%). This indicates that MR-E did not recommend exactly the same treatments as did the original articles. However, the results do indicate that the suggestions offered by MR-E are similar to those from the published reports, particularly in terms of the broader categories of management/treatment approaches and major behavioral principles.

To find the source of those differences, we compared the relative frequencies of the variables in the original publications and in MR-E reports created by the four clinicians (see Figure 1). In terms of management/treatment approaches, MR-E recommended proactive management procedures much more frequently [$t(29) = 7.75$,

$p < .001$] and recommended reactive management procedures less frequently [$t(29) = 2.26$, $p = .03$]. Although we also saw this pattern for proactive and reactive treatments, the differences were not significant. For major behavioral principles, MR-E offered more suggestions relating to positive reinforcement [$t(29) = 2.41$, $p = .02$] and negative reinforcement [$t(29) = 2.57$, $p = .02$]. It less frequently suggested positive punishment procedures [$t(29) = 2.65$, $p = .01$]. Although we saw a similar pattern for negative punishment and extinction, there were no significant differences at those levels (see Figure 1). In terms of specific treatments, MR-E recommended extinction, verbal prompts, the development of functionally equivalent skills, self-management training, relaxation training, increasing the positive reinforcements for appropriate behaviors, environmental changes, and desensitization significantly more frequently than did the articles (see Figure 2). In contrast, the articles recommended response cost, physical restraint (less than 5 min), exclusionary time-out, and DRO significantly more often than did MR-E.

In terms of specific treatments, MR-E offered significantly more treatment options per client than did the articles, with an average number of recommendations per client of 6 and 3.5, respectively [$t(29) = 7.25$, $p < .001$]. Indeed, MR-E offered more treatments for 29 out of the 30 cases. Seven of the original articles discussed only a single treatment. These cases proved difficult for MR-E, which was able to produce a treatment agreement on only two of those seven cases. The literature for two of

Figure 1. Average number of basic principles and treatment/management recommendations offered per case. * $p < .05$. ** $p < .001$.

Figure 2. Specific treatment recommendations from MR-E and the articles. Categories recommended in fewer than 10% of the cases are not shown. * $p < .05$. ** $p < .01$. *** $p < .001$.

the remaining five cases described treatments that MR-E does not recommend (verbal reprimand and medication), while it described DRO (2) and DRA for the other three.

DISCUSSION

In this study, we found that MR-E recommended treatments that were similar, though not identical, to those in the published literature. The differences were qualitative as well as quantitative at each of the three levels we assessed.

MR-E offers a more proactive approach, which focuses on environmental change and the development of functionally equivalent skills that can replace undesirable behaviors. This proactive approach fits well with the concept of positive programming (LaVigna, Willis, & Donnellan, 1989), which emphasizes functional assessment, skill development, and environmental manipulation. In contrast, the published articles favor reactive strategies that are implemented after the behavior in an attempt to manage and decrease that behavior through various contingencies (Gardner & Cole, 1987).

MR-E's reliance on behavioral accelerative approaches (positive and negative reinforcement) as opposed to decelerative approaches (punishment and extinction) stresses the development of new replacement skills rather than

trying to reduce undesirable behaviors. Such accelerative positive approaches may reduce the need for more intrusive decelerative procedures (Axelrod, 1987).

At the level of specific treatment procedures, MR-E's emphasis on proactive, positive approaches is clearly reflected in the specific treatments that it recommends. It offers environmental change, positive reinforcement, self-management, and skill development more often than do the published articles, whose positive recommendations focus more frequently on extinction procedures and differential reinforcement of other behaviors (DRO). The reliance on DRO, while useful (Homer & Peterson, 1980), may not be optimal, because the function of an undesirable behavior may need to be determined for the treatment to be successful (Vollmer & Iwata, 1992). In DRO, extinction is used on the target behavior and reinforcement is provided for any other behavior. Treatment efficiency may be increased by combining the extinction procedure with the reinforcement of an incompatible or alternative functional behavior (DRI or DRA). Other authors have echoed these recommendations (Carr et al., 1990; O'Brien & Repp, 1990). Even though all 30 case studies included some form of functional assessment that could help identify incompatible or alternative behaviors, the published articles did not recommend the more specific, and theoretically more effective, forms of differential reinforcement.

There was also a difference in the absolute number of treatments offered for each case. This may be due to a difference in purpose. Articles typically extol the virtues of a specific treatment or assessment/treatment combination. As such, attention is focused on describing a single treatment or limited set of treatments, excluding most other possibilities. By highlighting procedures against a backdrop of other approaches, authors help crystallize a treatment in the reader's mind. MR-E's consultations, on the other hand, seek to provide clinicians with a range of possible treatment approaches tailored to a specific individual (Hile & Desrochers, 1994). Thus MR-E's advice may offer a more balanced selection of treatments than any single article can. Additionally, the interaction between the clinician and MR-E in developing these various recommendations changes clinicians' treatment conceptualizations more than does providing clinicians with the same information in a written report (Hile & Campbell, 1993). With MR-E, clinicians are provided with more treatment choices in a way that increases their impact.

We do not wish to deny the usefulness of highlighting specific treatments, because clinicians need to learn about new techniques. Indeed, MR-E also provides detailed information about specific treatments. The creation of a treatment protocol for an individual with undesirable behaviors may require a broader approach, however, so MR-E provides clinicians with both kinds of information. It provides specific treatment suggestions in a less time-consuming manner than the scientific literature and offers a conceptually consistent and integrated framework of multiple treatment from which clinicians may choose.

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NOTE

1. A copy of this instrument is available from the first author.

(Manuscript received November 16, 1994;
revision accepted for publication January 27, 1995.)