PERCEPTUAL ISOLATION, SENSORY DEPRIVATION, AND REST: MOVING INTRODUCTORY PSYCHOLOGY TEXTS OUT OF THE 1950s

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ABSTRACT

This paper examines the treatment of sensory deprivation research (now usually referred to as the Restricted Environmental Stimulation Technique, or REST) in 185 introductory psychology textbooks published between 1956 and 1986. The research area has undergone drastic changes during those three decades, moving from very dramatic early findings which were widely publicized but have to a great extent proven unreliable, to systematic investigations and replications, and most recently to well-established applications in a number of fields including behavioural health. Nevertheless, most textbooks still describe the results in terms of such largely abandoned issues as hallucinations, cognitive impairment, and high stress. The modal reference even in the mid-1980s is still to articles published in the mid-1950s. A thirty-year delay in assimilating scientific developments into texts is not only unusual but unacceptable, particularly when it results in giving successive generations of students a highly inaccurate view of a research area that has made significant progress and contributions.

In the recent past, psychologists have become increasingly aware of the gap between data as they are collected, analyzed and reported in the primary scientific literature and as they are summarized and interpreted in secondary publications. For example, the research performed at the Hawthorne (Illinois) plant of the Western Electric Company (1927–1932) is usually described as showing that worker morale and productivity improve when workers think that management is trying to improve the conditions of work, regardless of what changes are actually made; or conversely, that workers perform better when they think that they are being evaluated by management. Both interpretations ignore repeated occasions, evident in the original reports, of worker dissatisfaction about — and active resistance to — changes in the work environment and conditions (Bramel & Friend, 1981). As another example, the classic Allport and Postman (1945, 1947) study on the transmission of rumour has been frequently misinterpreted as bearing directly on the issue of the reliability of eyewitness testimony (Treadway & McCloskey, 1987). These and several analogous mishandlings have sometimes been attributed to motivated distortions of memory: i.e., the author of the secondary publication wants to make (or conceal) a point, and slants the description of the experiment or its results accordingly (e.g., Bramel & Friend, 1981; Wormith, 1986).

There are, of course, other possible interpretations of why secondary reports differ significantly from primary sources. Some can be deduced from psychological principles of memory and perception, such as those of assimilation and contrast, primacy and recency, context, adaptation, and the like. According to such explanations, the errors in reporting the primary material follow well established laws that govern how any material is perceived, remembered, and described. For example, the first findings reported in a new area may be remembered best (primacy), or the most striking or unusual findings may attract the most attention (the von Restorff effect). Another, and perhaps the most parsimonious, hypothesis is that of cognitive economy (or laziness). Given the human being's limited capacity to retain and process information, people may read things cursorily and fail

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to check back to confirm their memories. Others may work primarily from secondary sources such as reviews, summaries, and earlier textbooks. The real relevance of the Allport and Postman study here might be that we are not actually dealing with secondary, but with tertiary or even further removed sources, with reviewers and textbook authors never having read the original reports, but only earlier textbooks and reviews. Successive transmission may have resulted in more and more distortion, just as reported by Allport and Postman. The resultant misreporting, in many science textbooks, was analyzed recently by Paul (1987).

This paper is concerned with the operation of all or some of these mechanisms in the way that introductory psychology textbooks treat experimental research on the effects of low ambient stimulation on human beings. Aside from our interest in the topic, it seems particularly apt because Canadian psychologists not only pioneered this research but have remained prominent in the field over its entire 30-year history. A brief look at that history may help to evaluate its presentation in textbooks.

Historical Summary

1955–1965. The research method was initiated in the early 1950s at McGill University, by Donald O. Hebb and his students. Labelled by them as *perceptual isolation*, the technique involved subjects lying on a bed for up to several days, wearing cardboard cuffs and gloves to reduce tactile sensations and being subjected to constant diffuse white light and noise to eliminate patterned vision and audition. Several publications reported the dramatic results, which indicated changes in a wide variety of psychological and psychophysiological processes (see below). Among the most striking and most widely publicized were:

1. Many subjects experienced hallucinations, primarily in the visual mode. While some of these were simple changes in perceived illumination, or geometric shapes, some were complicated animated scenes (Bexton, Heron & Scott, 1954; Doane, Mahatoo, Heron & Scott, 1959; Heron, 1961; Heron, Doane & Scott, 1956).
2. Subjects became extremely persuasible. For example, they requested to hear normally boring and puerile passages, and requested them again and again. After hearing a message supporting the reality of psi phenomena, they indicated considerably more acceptance of this possibility than did control subjects hearing the same material (Bexton, 1953; Scott, Bexton, Heron & Doane, 1959).
3. Cognitive efficacy — problem solving and the like — dropped from before to after the experimental session (Bexton et al., 1954; Scott et al., 1959).
4. Even though the chamber was comfortable and food and water were available, and even though the rate of pay was quite high for the time and circumstances, subjects experienced significant stress and most terminated the session relatively quickly (Heron, 1957).

Soon after the appearance of these findings in the scientific literature, many other investigators were attracted to the methodology and began to use it in a wide range of problem areas. Procedural variations were also introduced, including immobilization in a small box, sitting in a reclining chair, lying in an inoperative iron lung, lying on a bed in a dark, soundproof room, and being entirely submerged in water with underwater breathing apparatus (Rossi, 1969). Most early studies used relatively few subjects, from restricted populations (students, military personnel, or the experimenter and colleagues), and could best be defined as exploratory rather than rigorous and authoritative (Zuckerman, 1969a). Theories from the neurological to the psychoanalytic were adapted to explain the results. To cover the different techniques a new term, *sensory deprivation*, became current. Some confusion resulted because this label was used for the specific technique involving darkness and silence as well as for an umbrella term for sensory restriction approaches generally (Brownfield, 1965).

The phase of the research that we have been describing is, perhaps, best characterized by the proceedings of a symposium held at Harvard University (Solomon, Kubzansky, Leiderman, Mendelson & Wexler, 1961). However, the best known summary of the earliest results was published in *Scientific American* and has become a classic; its title has, unfortunately, come to characterize the field in the minds of many nonspecialists: "The Pathology of Boredom" (Heron, 1957).

1965–1975. By the early 1960s, several issues had become clearer. Most prominent among them was that the effects attributed to sensory deprivation during the preceding decade were not nearly as coherent and replicable as had been thought at first. Many of the negative

consequences could be elicited by inducing anxiety in the subjects, so that the role of sensory deprivation per se in producing them became moot (cf. Orne & Sheibe, 1964). Other outcomes seemed to appear and disappear from one study to the next. The heterogeneity of outcomes and research settings led one authoritative reviewer to characterize the McGill data as having been the results of an inseparable mixture of influences, of which the change in the perceptual environment was only one, and therefore to a great extent nonreplicable (Zubek, 1969).

One of the most widely cited results, visual sensations, continued to be reported (Zuckerman, 1969b); but these were probably no more frequent than in an ordinary bedroom when the person is in a hypnagogic state: Zuckerman, surveying 33 separate reports, concluded that the modal number of subjects reporting visual sensations of any sort during any given experiment was zero. Actual hallucinations — i.e., percepts that the subject thought were real and over which he or she had no control (criteria that the McGill researchers had not considered) — were practically nonexistent (Suedfeld & Vernon, 1964).

Other early findings were re-interpreted and refined. The original perceptual isolation technique, now relabelled *monotonous stimulation* or *perceptual deprivation*, was seen as being in a different class of methods from those imposing stimulus reduction, since constant monotonous input is probably as stimulating as, if not more so than, the normal sensory environment (Rossi, 1969). Another widely publicized early finding, negative impact on cognition, was replicated only on some measures; others showed no consistent change, or even improvement (Suedfeld, 1969a). A third, persuasibility, also was somewhat more complicated than had appeared at first. The willingness to receive usually boring information was now viewed as a raised level of tolerance, not attitude change, analogous to the willingness of a very hungry person to eat a usually disliked food. There is no particular reason to think that one's attitude toward the material, or the food, changes. Rather, the willingness to accept it in the current situation is increased (Suedfeld, 1969a). However, other data did provide support for increased suggestibility and persuasibility, under specified conditions (e.g., originally neutral topics, and certain topics) (Myers, Murphy & Smith, 1963; Suedfeld & Vernon, 1966). A few studies explored the applicability of this effect in the context of clinical treatment (Gibby & Adams, 1961; Adams, Robertson & Cooper, 1963).

Methodological changes also occurred. Many of the techniques tried in the first decade were essentially abandoned. Two survived in active research programs: sensory reduction in a dark, silent chamber, and perceptual monotony in the McGill mode. The attempt to re-design procedures to minimize the confounding effects of expectancy, uncertainty and stress (e.g., having set durations, removing "panic buttons," orienting subjects to the environment prior to beginning the sessions) eliminated the last of the dramatic early phenomena by tremendously reducing the aversive reactions of subjects: attrition rates decreased to 10% or less, and many participants rated the experience as positive and pleasant (Suedfeld, 1980).

To sum up the second decade of research, it became much more systematic and rigorous; a number of replications appeared; and while some early findings were discovered to be unreliable or due to factors other than stimulus reduction, other effects were by now firmly established. The most active and systematic investigator of this era, John P. Zubek at the University of Manitoba, with the assistance of students and colleagues, began to explore the components of sensory deprivation parametrically. The already copious research literature was summarized and interpreted by its most active contributors in a book edited by Zubek (1969), who also wrote a brief but comprehensive *précis* a few years later (Zubek, 1973). Just at the end of this decade, an attempt was made to update the picture drawn by Heron's famous (1957) "pathology" article. "The Benefits of Boredom" (Suedfeld, 1975) pointed out some of the ways in which later research had changed our understanding of the effects of stimulus reduction, but — as it now appears — at the textbook level the impact of this attempt had only limited results.

In the period of the late 1960s and early 1970s, another issue arose to becloud the general understanding of this research area. To a large extent because of the political ferment of those years, and because political activists viewed sensory deprivation as analogous to solitary confinement and torture, several researchers came under attack. The attacks ranged from hostile publications in the popular media and in professional journals to actual physical violence against researchers. In the arguments leveled against

sensory deprivation, the aversive and deleterious effects reported during the first research period were emphasized and even exaggerated, with no indication of the ameliorative and more reliable data produced during the second decade. As a result, some investigators left, and others probably avoided, the field. There is also at least anecdotal evidence that journal editors and perhaps grant reviewers viewed sensory deprivation research unreceptively.[1]

1975–1985. Ever since the invention of the technique at McGill, there were always a few laboratories active in the area. Twenty major centres were identified in the first decade (Suedfeld, 1969b); only three were carrying out programmatic research by 1975, with another few laboratories producing occasional papers (Suedfeld, 1980). In the third decade, there was a new proliferation: by 1985, there were at least eight ongoing contributors and at least as many sporadic ones. Among the third-decade laboratories, the one at the University of British Columbia has been perhaps the most visible.

At this time, investigators began to concentrate their attention on further extension and application of the best established basic findings. Two major occurrences began to rekindle attention and attract researchers back to the area. One was the discovery that stimulus reduction, either alone or combined with other techniques, was a highly effective treatment in habit modification (e.g., smoking cessation) (Best & Suedfeld, 1982; Suedfeld & Ikard, 1974); the other was the invention and publication by John C. Lilly (1977) of a method for floating in a warm solution of Epsom salts. This technique is generally found to induce deep relaxation and enjoyment, providing a complete turn-around of the image of water immersion and stimulus reduction generally as extremely stressful.

Potential contributions to behavioural medicine (Suedfeld & Kristeller, 1982) led to an increased number of projects exploring further therapeutic applications of REST in habit modification. This work was in many cases initiated by graduate and even undergraduate students. Some of these students were proceeding under the supervision of established researchers in the field, but others had to convince faculty supervisors to allow them to use such a novel (and sometimes denigrated) method. The flotation method was quickly adopted, not only for enjoyment but also as a component of stress management and the treatment of stress-related disorders (Fine & Turner, 1982; Jacobs, Heilbronner & Stanley, 1985; Koula, Kemp, Keane & Belden, 1987; Suedfeld, Ballard & Murphy, 1983). Methodologies used in the field were again held at two: darkness and silence, either in a chamber or in a flotation tank. Both became labelled as *Restricted Environmental Stimulation Technique* (or Therapy, depending on the usage — abbreviated in either case as *REST*), to avoid the denotatively and connotatively inaccurate meanings of "sensory deprivation" (Suedfeld, 1980).

The steadily growing mass of scientific results was reviewed in a book by Suedfeld (1980). The coverage included the known results of stimulus restriction in early life, on both human and infrahuman young, and its role in both traditional and novel therapeutic procedures. Developments in neuropsychological, psychophysiological and psychological theory were reviewed as they applied to REST. The validity of the political criticisms that appeared in the previous decade was also assessed. Two books dealt with flotation REST specifically: Lilly (1977) described the construction and use of the flotation tank, with a number of personal anecdotes describing reactions to floating, by Lilly himself and a heterogeneous group of participants at Esalen, the California centre of humanistic psychology; and Hutchison (1984) wrote a popular treatment of the effects of tanking.

The public image of the method improved greatly during this period. The successful science fiction movie, *Altered States*, presented an exciting although completely inaccurate version of flotation. In response to public demand, commercial flotation centers charging about $20 per hour in the tank sprang up across North America. An industrial association, the Floatation Tank Association, was formed during the First International Conference on REST and Self-Regulation (Denver, Colorado, 1983), with the goal of providing information and monitoring. In view of the popularity of pay-to-float facilities, it was difficult for most people (except textbook authors, as we shall see) to continue maintaining that "sensory deprivation" was aversive, damaging, and a form of torture.

[1] These conclusions are based on numerous conversations with colleagues, both those who are or were active in sensory deprivation research and others; and on a large number of newspaper and magazine articles, letters from editors and reviewers, etc. Even aside from issues of privacy, there seems to be no scientific purpose in citing any of these individually.

Professional acceptance also began to increase, and the volume of scientific publications went up. The International REST Investigators' Society (IRIS) was formed at the same meeting as the Floatation Tank Association, to disseminate information to researchers and therapists through its bulletin and through conferences. A number of research projects and laboratories in the United States (among others, at St. Elizabeth Hospital, Appleton, Wisconsin; the Medical College of Ohio, in Toledo; Washington State University; the University of Vermont; and the State University of New York at Stony Brook), Europe (in Strasbourg; at the Université de Compiègne; and at the Institut Médical Edith Cavell, in Brussels), and Australia (Caulfield Institute of Technology) became active or were re-activated during this most recent period.

As of 1987, almost 20 projects had reported on the use of REST in smoking cessation (Suedfeld, 1987), with lesser numbers in other intervention areas. Three international conferences had been held, and their proceedings made available (Fine & Turner, 1985; 1987; in press). Selected papers from these meetings, concentrating on theoretical and research issues related to flotation REST, are about to be published (Suedfeld, Turner & Fine, in press). At the 1984 International Congress of Psychology, two symposia were held dealing with REST (Forgays, 1984; Suedfeld, 1984). Clearly, the technique is regaining favour, although it is still greatly underutilized in comparison to the strength of its data base.

The field has moved: the first decade was characterized by diffuse and exciting exploration; the second, by systematic and parametric research and the beginnings of political repression; the third, by systematic applications to problems of behaviour and health, increasing theoretical sophistication, and public popularity for recreation and enjoyment. How have these rather drastic shifts been reflected in introductory textbooks?

The Second-Hand View

To begin with, we must point out a significant difference between examples such as the Hawthorne or Allport and Postman studies and our current concern. When one deals with a specific study or research project, it should be easy enough to read or re-read the original publication and reproduce the method, results and interpretations in a secondary publication. The field of REST research is something else again. To illustrate, Zubek's exhaustive review book (1969) listed some 1,300 references. Not all of these were directly in the area of sensory deprivation, of course, but most were. Suedfeld's (1980) review, which concentrated on material that had either not been emphasized by Zubek or had been published after the Zubek book, had about 1,400 items in the reference section.[2]

Obviously, one cannot expect the author of an introductory text to sample even a major portion of such a massive literature. Furthermore, as we have seen, the thrust of the material in those publications changed over time, in some ways quite drastically. Last, there was and is disagreement within the field itself as to optimal methodology and experimental design, the reliability and proper interpretation of the data, and the most appropriate theoretical explanations. Again, unless the textbook author is personally interested and/or involved in this field, which very few have been, one cannot expect a treatment that is either fully informed or satisfactory to all specialists.

With those concessions, we should think about what one is entitled to expect. REST research, after all, has shown some interesting things about the transaction between the individual and the environment, has produced some reliable data on perception, cognition, psychophysiology, attitude formation and change, motivation and emotion; and has also established surprising and counterintuitive facts related to interventions in several areas of behavioural health. The relation between sensory reduction and torture is an interesting example of an apparently logical hypothesis exploded by the data; the relation between the method and such situations as extended space flight or work in isolated remote environments such as the polar regions is also intriguing and is being actively explored by researchers. More mundanely, stimulation in childhood and environmental design characteristics that affect stimulation level are clearly related. REST findings are also relevant to some of the important and new theoretical interests covered by most introductory texts — e.g.,

[2] The volume of the literature is the reason why most references in the Historical Summary of this paper are to reviews rather than to individual experimental reports. For example, Zuckerman (1969b) reviewed over 30 studies on reported visual sensations, and Suedfeld (1969a) over 80 studies on changes in intellectual performance; it would be impossible to present a complete review here.

cerebral dominance, altered states of consciousness. It may be appropriate to expect that a text that deals with these issues will mention at least some of the current knowledge in the field of REST, and that texts incorporating discussions of REST research per se show some awareness of its current state.

In an earlier look at this question, Scott, Cooper and Adams (1980) read a sample of 82 introductory texts, of which 24 had a section on sensory deprivation. While these sections were not analyzed systematically, Scott et al. judged that 17 of the 24 were entirely or mostly unfavourable about the effects of the technique, six were neutral, and only one was mostly favourable. Most texts showed no awareness of then-recent research in the field, many citing only the McGill studies.

The lack of an objective content analysis was a problem with the Scott et al. report, as was the lack of information about when the sampled texts had been published. If most of them had originated in the first decade of REST research or very soon thereafter, it would be unreasonable to criticize them for relying on the data produced during those years. Finally, the recognition and amelioration of confounding and nonreplicability, the firmer establishment of a reliable data base, and most positive findings and applications, occurred in the mid-1970s and later, so that a 1980 review may have been somewhat premature. The present study was designed to fill these gaps.

Method

One hundred and eighty-five introductory psychology textbooks, published between 1956 and 1986, were obtained from University bookstores and libraries and from the collections of instructors who had taught the course. Since this was a "convenience sample," we expected that it would include the most widely used texts as well as more obscure ones, and successive editions of most successful books. Informal inspection showed this to be the case. For each book, the index and table of contents were searched for the terms sensory deprivation, perceptual isolation, stimulus restriction, and variants. All references to such terms were looked up in the text material. References dealing strictly with infrahuman animals, infants, and individuals in unusual living situations — hermits, prisoners, and the like — were eliminated; discussions of experimental research with human adults were photoduplicated and coded as to the book in which they appeared.

A set of content categories was generated a priori, incorporating items that were prominent in either the historical development or the current state of REST research. These included methodological, empirical and theoretical factors as well as applications. The length of each treatment (number of words) was also measured. Primary sources cited in each excerpt, and any illustrations provided, were recorded. Finally, the content of the section was rated as including positive references (such findings as the enhancement of imagery, learning, relaxation, or sensory acuity), negative ones (comments about temporary psychoses, anxiety, early termination, cognitive impairment, etc.) or neutral ones (descriptions of methodology, for example). Content analyses were performed by both authors to ensure agreement.

In the presentation of the results, the texts are categorized by their date of publication.

Results and Discussion

The textbooks were grouped by decades, except for the last year of the survey (1986), which is presented individually in order to provide the most contemporary "snapshot". The results are summarized in Table 1, which includes several global analyses as well as all of the content categories that generated enough entries to warrant statistical treatment. During the 31 years covered, there has been a reasonably consistent degree of coverage of REST research in introductory texts. Except for the earliest decade, about 75% of texts have discussed the area. The length of treatment has also remained fairly constant except for the first time period, median length of discussion hovering around 450 words (between one and two pages of print). This appears to be sufficient to convey a considerable amount of information.

Let us turn to the actual content of these presentations. Given the massive changes that have occurred in the field, one might expect there to be similar changes in how REST is described in those textbooks that contain entries on the topic. The actual results, however, indicate that there has been little change in the treatment of this material since the mid-1950s.

To start, we made a global assessment of the appearance of negative materials in each presentation. Negative statements included reports of hallucinations, cognitive and perceptual

TABLE 1

Introductory textbook coverage of REST research

	Textbooks Published			
	1956–65	1966–75	1976–85	1986
Number of Textbooks Surveyed	21	71	79	14
% Mentioning REST	54	80	75	71
Median no. of words	692	426	431	439
Nature of coverage (% of statements referring to):				
Negative	97	98	95	83
Hallucinations	84	85	85	89
Intolerable	78	42	60	55
Stimulus hunger	67	51	44	44
Cognitive distortion	78	57	59	55
Perceptual distortion	39	29	30	44
Negative emotions	28	35	39	33
Boredom	22	26	25	22
Restlessness	28	14	12	22
Brainwashing	17	30	20	33
Stress	39	11	17	22
Solitary confinement	28	11	18	11
Negative aftereffects	0	26	13	22
Psychosis	11	9	10	0
Drugs	17	11	11	11
Balanced[a]	0	15	25	33
Pleasantness	0	2	11	22
Therapeutic uses	0	0	16	33
Use of term "REST"	0	0	2	11
% Citations of McGill studies	70	49	47	32

[a] See text of article for explanation

distortions, the unpleasantness or stressfulness of the environment, and so forth. For each textbook considered, the percentage of the entry that conveyed a negative view of REST was then determined. As can be seen from Table 1, over the three decades of the survey a median of 95% of the coverage consisted of negative statements or reports of negative effects. There was a slight improvement (to 83%) in 1986.

A breakdown of the coverage into specific categories is equally disheartening. Over the period of the survey, the number of textbooks mentioning hallucinations as one effect of REST remains constant at about 85%. While the earliest decade produced the most negative characterizations of REST in most categories, we still find that over half of all texts surveyed specifically mention cognitive distortions and intolerance of the REST environment as major findings. Over a third of the books continued to report perceptual distortions, negative emotions and stimulus need; around a quarter emphasize boredom and negative aftereffects, while the same number refer to the "negative effects" of REST in the context of brainwashing and solitary confinement. Perhaps the most amazing aspect is the constant level of such negative representations across this extended time period.

At this juncture the reader may wonder how more contemporary findings are being incorporated into this gloomy approach. The answer is that textbook authors do not take into account very much, if any, of the research published after the original McGill studies. This becomes strikingly clear if we compare the median date of the publications cited in each text with the date

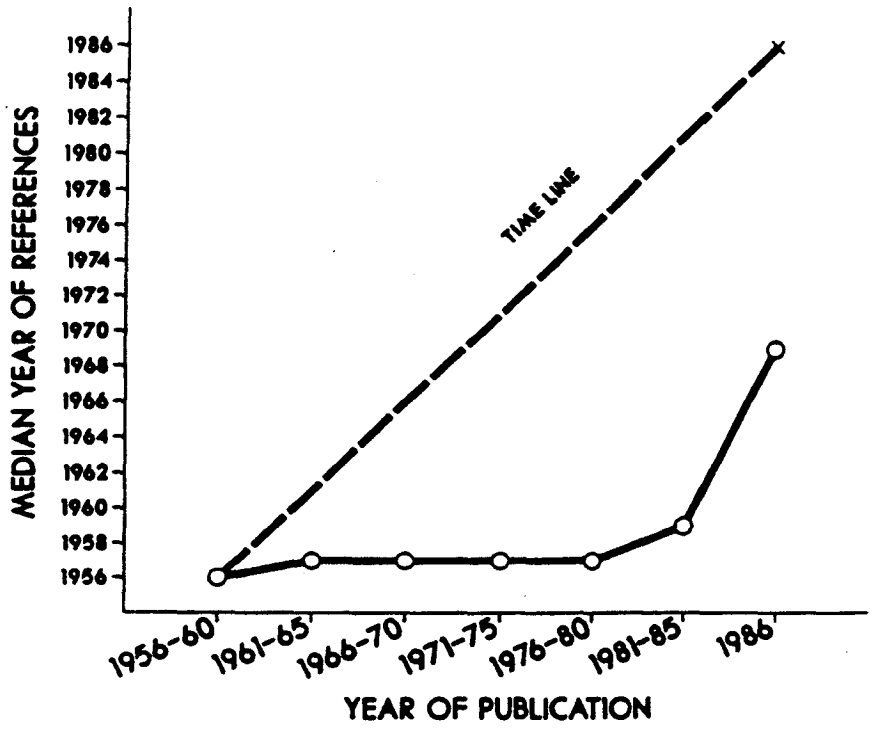

FIGURE 1
Year of text publication and year of median REST references

of publication of the textbook itself. These data are shown in Figure 1. The dashed line in that figure represents the current time line — i.e., references published in the same year as the text in which they are cited. Obviously, we cannot expect texts to stay up with that time line; but it does seem reasonable to expect that the median date of references will rise with the date of text publication, thus indicating that the author is monitoring recent, if not current, developments. But in the case of REST, the median date of references seems to have stalled at about 1957. Texts published in 1986 are an exception: with a median reference date of 1969, they are "only" 17 years out of date!

The overall pattern of citations suggests that introductory textbook authors have been captured by the dramatic reports of hallucinations, emotional distress and perceptual and cognitive deficits that emanated from the McGill reports. This phenomenon is clearly revealed when we consider the papers most frequently cited in the discussions of REST. Table 2 lists the five most cited papers; the numbers in parentheses show the percentage of the *total* number of REST-related references that each item accounts for. The two most frequently cited references have been Bexton, Heron & Scott (1954) and Heron's paper in *Scientific American* (1957). These two papers represent more than 25% of the total number of relevant citations during the first 30 years of this survey, and 19% even in the last year. Turning back to the last line of Table 1, we see that the McGill studies have

TABLE 2

Five most frequently cited REST publications (% of all REST citations)

1956–65	1966–75	1976–85	1986
Heron 1957 (19)	Bexton et al. 1954 (16)	Bexton et al. 1954 (14)	Bexton et al. 1954 (11)
Lilly 1956 (19)	Heron 1957 (12)	Heron 1957 (13)	Heron 1957 (8)
Bexton et al. 1954 (15)	Heron et al. 1956 (9)	Suedfeld 1975 (8)	Suedfeld 1975 (8)
Heron et al. 1956 (7)	Lilly 1956 (7)	Heron et al. 1956 (7)	Heron et al. 1956 (7)
Heron 1961 (7)	Zubek 1969 (7)	Lilly 1956 (6)	Orne & Scheibe 1964 (6)
Hebb 1955 (7)			Suedfeld 1980 (6)

accounted for about half of the papers referred to most during the time covered by this survey and that even in 1986 about a third of all references are still to the largely superseded McGill findings.

Is there anything to justify optimism that authors are taking cognizance of the drastic changes in the state of knowledge about REST? There are indeed some hopeful signs. As Table 1 indicates, over the last decade about one out of four authors has included what we call "balanced" statements. These are suggestions that REST does not *always* or *necessarily* result in severe negative consequences. Such comments reach only a low threshold definition of hope, since most "balanced" statements are in the form: "Although negative effects are not always found, subjects often report . . . (hallucinations, severe stress, negative emotions, performance deficits, etc.)"; or, "Although subjects generally show (negative effects), some have not responded in this way." Thus, the commentary was categorized as balanced even if it was almost completely negative, with only a minor addendum to the effect that the lurid findings are not universal.

A stronger basis for optimism is that there are now occasional descriptions of REST studies which do contain at least one reference to pleasant experiences (11% of texts from 1976 to 1985, and 22% in 1986) or therapeutic applications of the technique (16% in the last decade, and 33% in 1986). Thus, some changes may be underway. One intriguing question is whether the notable innovations in the texts published in 1986 represent a new trend or only a blip in the curve.

One may ask why textbook writers have lagged so far behind in their treatment of this particular research area. If the delay reflects a belief that in fact nothing has happened in the field since 1957, one is led to wonder why such a misperception could occur among so many colleagues who, by definition, are self-selected as having an interest in the complete range of psychological topics. REST research has been published widely, in books bearing the imprint of well-known companies and in standard scientific journals. It is probably no more difficult to monitor than current work in any other mode, such as biofeedback or attribution.

One possible answer is sad to consider, but may have some validity. Perhaps textbook authors have ignored the past 25 years of research in order to retain a "good story." The early studies had very dramatic findings. It may be intriguing to describe students (just like the students who are the intended readers of the book) who are in an apparently bizarre situation, manifesting psychotic-like symptoms and other unusual signs. The outlandish nature of the environment and its effects could be visually magnified by illustrations showing a McGill subject, wearing goggles and cardboard cuffs, supine in a chamber with noise-generating apparatus prominently visible. This picture is, in fact, the modal illustration of REST and accounts for over 90% of all REST-related illustrations in introductory textbooks — in spite of the fact that such equipment is almost never used now, and has been used only rarely in the past 10 to 15 years.

In these respects, the discussion of REST may provide an interesting aside in an otherwise dry chapter. This may seem a cynical conclusion; but it is reinforced by the fact that the most competitive illustration, which appears in recent texts that take a more positive viewpoint toward REST, is a picture of an attractive woman, wearing a bathing suit, who is shown either entering or floating in a tank. Over the last six

years surveyed, such pictures have accounted for nearly a quarter of the illustrations.

What is truly sad is that an accurate and timely summary of REST research would show it to be just as dramatic and strange, although in different ways, as the outdated one. Why, for example, should 24 hrs. spent lying comfortably on a bed lead to substantial increases in the ability to stop smoking? Why should one-hour sessions floating in a tank improve one's ability to solve intellectual problems? Such data, and the questions they raise, are at least as interesting as the pseudo-issues so commonly covered by textbooks.

General Discussion

REST research provides an interesting example of a field that started with very dramatic findings and attracted considerable attention from both professionals and the general public. As research proceeded, however, the drama was replaced by rigour and systematic mapping of behavioural effects. During the course of this work, it became clear that the original findings may have been atypical and unrepresentative, and the reasons for these unusual outcomes have been suggested.

The current body of knowledge is extensive and solid. The boundaries of knowledge are still being pushed back; and in some areas, the new results can again be characterized as dramatic. For example, flotation REST provides the most profound relaxation many participants have ever experienced. Its effects have been verified by physiological as well as self-report measures. In combination with other treatments, REST has been used in the treatment of a number of health-related problems (e.g., smoking cessation, weight reduction, tension headache, essential hypertension, chronic insomnia). In habit modification, for example smoking cessation, it produces extremely high success rates and unusually low rates of relapse.

In the past few years, promising but as yet only exploratory studies have shown glimpses of the possible uses of the technique. It has been used to treat chronic pain (Fine & Turner, 1985), compulsive hair-pulling (Barabasz, 1987), autistic symptoms (Suedfeld & Schwartz, 1983), and severe morning sickness (Simone & Long, 1985), and to reduce self-rated amnesia by patients who had received electroconvulsive treatments (Suedfeld, Ramirez, Remick & Fleming, 1987). Current research shows that REST facilitates hypnotizability (Barabasz, 1982), athletic performance (Stanley, Mahoney & Reppert, 1987) and complex behaviours such as creative thinking (Suedfeld, Metcalfe & Bluck, 1987; Taylor, 1985) and performance on a flight simulator (Melchiori & Barabasz, 1987).

The fact that introductory textbooks are still mired in the mid-1950s is difficult to explain. One need only to browse through the treatments of other substantive areas of psychological research to note that references, data summaries and illustrations seldom seem to be more than five or at the outside ten years behind the times. Certainly no text would be considered publishable today if its treatment of other areas showed a 30-year time lag. We would still be teaching learning theory as represented by Hull and Spence, brain-behaviour relations in terms of Gestalt isomorphism and tentative hypotheses about cell assemblies, development as age-related achievement norms (no Piagetian or Kohlbergian stages), clinical psychology as mostly psychodynamics with the beginnings of existential and behaviouristic explorations, cognition as a very narrow field of problem-solving and memory, motivation as depicted by Lewin, social psychology as centred on cognitive dissonance, and so on. While these examples may seem ludicrous, they come from textbooks of the very era whose data are still being cited as representing REST. Obviously, recent developments build upon earlier accomplishments; but to researchers active in REST, and to those who might apply their findings, the data of the McGill group are as thoroughly "historical" as the others cited above and have as little direct influence on contemporary thinking at the leading edge of the science.

While the results presented in this paper may seem merely an amusing aberration to colleagues who are not particularly concerned with REST research, there are reasons to treat them as rather disturbing. For one thing, they reveal a gross distortion of known psychological facts being communicated by introductory texts. This is a violation of the profession's obligation to present its knowledge accurately and fully. The long-term consequences of this failure may be significant, since "Undergraduate students often assume that because a finding appears in a textbook it must be true" (Sommer & Sommer, 1984, p. 1318). The students who leave the classroom and the university with this misunderstanding will become the next generation of

psychologists, physicians, journalists and politicians, and of the educated public generally. They will affect directions of research and treatment by their choice of topics, their attitudes toward various fields and methods, their presentation and perception of scientific findings, and their willingness to fund and use novel techniques. Unless their distorted view of REST research is corrected, a productive research method and an effective therapeutic procedure may suffer neglect, to the detriment of both the discipline and the public.

RÉSUMÉ

Cet article examine la recherche sur le traitement de la déprivation sensorielle (mieux connu de nos jours comme la Technique de la stimulation environnementale restreinte ou REST) telle que rapportée dans 185 textes d'introduction à la psychologie publiés entre 1956 et 1986. Le domaine de la recherche a connu des changements radicaux au cours de ces trois décennies, passant des premières découvertes dramatiques qui reçurent beaucoup de publicité mais qui furent qualifiées par la suite de non fiables, aux investigations et répliques systématiques et, plus récemment, aux applications bien établies dans plusieurs domaines y compris le domaine des sciences du comportement. Néanmoins, la plupart des textes décrivent encore les résultats en termes de sujets maintenant désuets tels que hallucinations, détérioration cognitive et grand stress. On réfère encore au milieu des années 80 à des articles publiés au milieu des années 50. Un délai de trente années entre l'assimilation des développements scientifiques dans les textes est non seulement inusité mais inacceptable d'autant plus que cet état de choses a pour résultats de transmettre une vue bien inexacte d'un domaine de la recherche qui a fait des progrès et des contributions significatifs.

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