

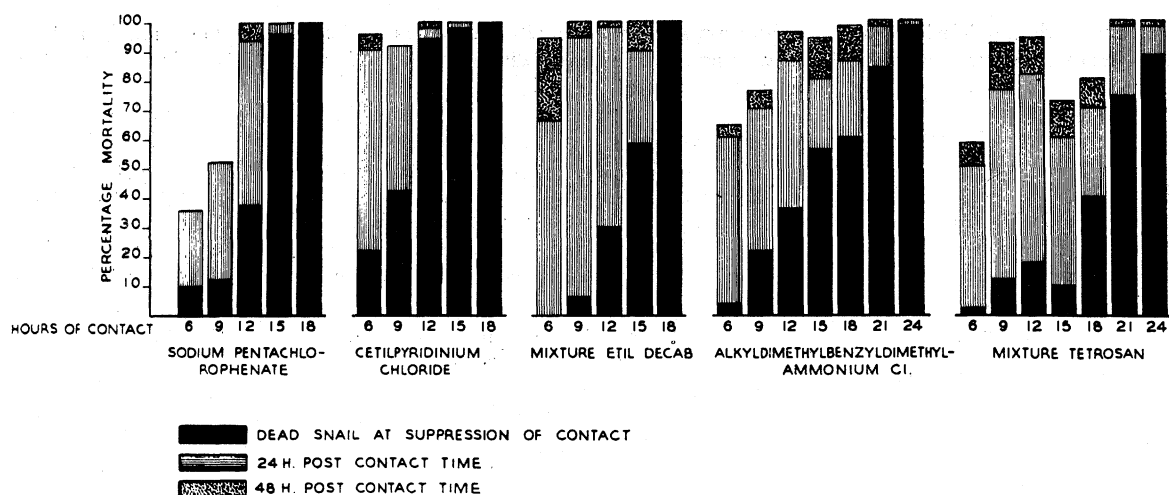


Fig. 1. Rapidity of action and retarded effect of 10^{-5} concentration upon *Australorbis* sp. snails 24 and 48 hr after suppression of effective contact time.

represents the percentage of dead snails checked after 48 hr of contact, discarding the live ones after removal from the test solution and extending the control of snails supposed dead over a period of 72 hr before recording.

With every chemical presented in Table 1 we analyzed the rapidity of action and the retarded effect of 10 ppm concentration of the active drug in tap water, and placed 50 snails simultaneously into each test flask. The snails remained in contact with the solutions for 6, 9, 12, 15, 18, 21, and 24 hr, respectively. After withdrawal from contact, the live ones were washed in soft running water, separated from the dead specimens, and placed in fresh tap water in separate flasks. The live snails were examined 24 hr later in order to separate and to count those that had died during this period. The same procedure was repeated after 48 hr.

Figure 1 shows results obtained with the more and the less active simple and mixed drugs. These results show that some quaternary ammonium compounds have the same or greater rapidity of action than sodium pentachlorophenate, and that with the majority of these compounds the retarded effect is great, with less time of effective contact with the active solutions. These preliminary results emphasize the potential importance of quaternary ammonium compounds in the destruction of the intermediate host of *Schistosoma* and suggest that drugs of higher activity can be found by more extensive research in compounds of that type.

Reference

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The Living Out of "Future" Experiences Under Hypnosis¹

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In hypnotic regression, the subject seems to relive experiences and memories of earlier times. If a hypnotized subject is told he is 5 yr of age, or that it is the afternoon of October 16, 1940, he will behave in a way appropriate to that age or time as if it were the present. This technique has been modified in a number of ways for therapeutic purposes, especially in the treatment of combat neuroses. It has theoretical implications of major concern to the psychologist and psychiatrist.

Psychologists have attempted to validate the phe-

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nomenon by the administration of projective and intelligence tests to hypnotically regressed subjects. For example, Bergmann *et al.* (1) regressed a soldier to alternate ages from 3 to 20. At each level, they gave him the Rorschach and reported that the test findings were representative of that age, showed the dynamics of that period, and did not reflect any experience subsequent to the suggested age level. Orne (2), however, in a study of ten university students to whom the Rorschach was administered during hypnotic regression to age 6, found no consistent changes in the test results and concluded that there was no evidence of true or complete regression, the personality actually remained adult.

Those who have studied hypnotic regression and noted the dramatic way in which the subjects relive their past experiences have offered this as a proof of its validity. It has remained a proof against which no contrary evidence has been offered.

One of us, as an undergraduate, discovered to his

surprise that hypnotized subjects were able to live out experiences appropriate to a suggested date in the future as well as in the past. Kline (3) has described the administration of psychological tests to subjects to whom advanced ages were suggested, and he felt that their performances on these tests were appropriate to these age levels. It occurred to us that, if a hypnotic subject could vividly live out and describe in great detail the events of a "future" time suggested to him, this experience could cast doubt on the validity of hypnotic regression to a time in the past. If "progression" is a fantasy, maybe regression is also a fantasy.

We have been working with a group of five easily hypnotized subjects, all of whom are capable of deep hypnosis with amnesia in which they are able to relive vividly past experiences. We find that all our subjects consistently and without exception are also able to live out "future" experiences when an age or date is suggested to them under hypnosis. For example, a medical student is told while he is in hypnosis that it is the afternoon of a day in October, 1963. The experimenter then asks:

Where are you now?

(Sighs) I'm pretty busy, got an emergency case that just came in—abdominal obstruction. This one's pregnant too, lot of complications. And we're in her abdomen right now. And I just don't have too much time to talk. (Describes patient's abdominal cavity.) I managed to get this diagnosis, which I was pretty happy about. (Describes presenting symptoms of patient and the resultant diagnosis.) It's mostly adhesions—a number of adhesions especially down in the lower right quadrant. Think all we have to do is go ahead and release these adhesions, but we found two spots in which there was a definite obstruction. *You did a good job of diagnosing this.*

Yeah. I was kinda glad to hit the diagnosis. (Describes similar cases encountered in 1958; shifts back to description of operation.) No ulcer. Close her up! Oh, she'll be all right.

All of our subjects live out "future" events in their lives with equal verisimilitude to their accounts of the past. Their futures sound possible and well within the

realm of probability, as judged from a careful personality study made prior to this investigation. Our subjects did not attempt to describe events outside their own lives, except in a most vague fashion. Their accounts of the future frequently contradicted their present plans and daydreams and sometimes include conflictual and traumatic experiences. For example, one subject, told that it was a late afternoon in October, 1963, portrayed her grief at the recent death of her 3-month-old son.

We believe that each of our subjects, to please the hypnotist, fantasied a future as actually here and now. We suggest that many descriptions of hypnotic regression also consist of confabulations and simulated behavior. We suspect, however, that our doubts do not apply to the reenactment of traumatic past experiences; that is, we feel that there is a great difference between asking a subject "regressed" to the age of 10 to describe a relatively uneventful day and his spontaneously dissociating and reexperiencing the death of his father under tragic circumstances (4).

We are now engaged in investigating this phenomenon. In addition to its relevance to hypnotic regression and to the whole problem of memory, we feel that it offers us a method of studying fantasies and daydreams and all the facets of personality evoked by a projective technique.

Summary. We have observed an experience that has been regularly elicited in a group of hypnotic subjects. This consists in their living out and describing the events of a future date or age suggested to them. We believe that this challenges the validity of hypnotic regression to a nonconflictual time in the past.

References and Notes

1. M. S. Bergmann, H. Graham, and H. C. Leavitt. *Psychosom. Med.* **9**, 20 (1947).
2. M. T. Orne. *J. Abnormal Social Psychol.* **46**, 213 (1951).
3. M. V. Kline. *J. Genet. Psychol.* **78**, 195 (1951).
4. M. H. Erickson. *Arch. Neurol. Psychiat.* **38**, 1282 (1937). This is a remarkable account of a patient who regressed to, and lived out, an amnesic experience in which he developed apparent unconsciousness from a beating and possible narcosis, which Erickson was later able to document from hospital and police records of that time.

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Communications

Sex Ratio and Parental Age

M. E. Bernstein, in *Science* **118**, 448 (1953), criticizes an article by the present writer that appeared in an earlier number [*Science* **117**, 531 (1953)]. The conclusion in my note was simply that the well-known change in sex ratio with increasing age of the parents could be attributed to the change in age of the father, the data indicating a linear relationship between the two. Her criticisms include the following points: (i) that the data are not linear; (ii) that there is a similarity between abortion rate versus age curve and sex ratio versus age curves; (iii) that the ages of husband and wife are positively correlated; and (iv) that

the data were unstratified and that data of hers from the "upper social strata" show no such age effect.

Of these objections, the third would be most serious if it were valid. Of course, the ages of husband and wife are positively correlated, and it is for just this reason that partial regressions were used. This method allows for the correlation mentioned and leads to the conclusion that, in our data, the age of the father is more directly related to the variation of sex ratio than the age of the mother. It is not true that Cioeco denies this possibility; he is correctly quoted by Bernstein as writing that his data "cannot be used to support any such conclusion." The later extensive data in my article