# Biorhythm Theory: A Critical Review

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The popularity of biorhythm theory has grown rapidly in the past few years. According to biorhythm theory, by determining in which phase a person is in their three separate sinusodial cycles (a 23-day physical cycle, a 28-day emotional cycle, and a 33-day intellectual cycle), predictions can be made about which days will be best (or worst) for engaging in numerous types of activities. A person's performance is claimed to be better on good, or "up," days, which make up the first half of each cycle, and worse on the "down" days of the second half of the cycle. Days on which a rhythm is shifting from the up to the down phase (or vice versa) are termed "critical days," and performance is supposed to be especially bad on these days. The worst type of day, according to biorhythm theory, is the dreaded "triple-critical day," when all three cycles are shifting phase on the same day. Although its popularity is rather recent, biorhythm theory has a history dating from the 1880s. Gardner (1966) has provided a fascinating account of that history.

Many claims have been made in the popular press and by those selling various biorhythm books and devices (slide rules, games, calculators, etc.) that biorhythm theory has been scientifically validated in studies that allegedly show that about 60 percent of accidents caused by human error occur on critical days. Since critical days make up only about 20 percent of all days, this certainly would be an impressive finding, if true. However, in the past several years much empirical work on biorhythm theory has

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shown that the claims made for the theory are without foundation. The present paper reviews this work.

## Evidence Used to Support the Biorhythm Theory

The evidence used to support the validity of biorhythm theory can be roughly divided into two types. First, lists of disasters, such as airline crashes and deaths of famous persons, that seem to follow the pattern predicted by biorhythm theory are reported. Thus, aircrashes that took place when the pilot (or co-pilot) was on a down or critical day are said to support the theory. So are lists of famous people who died on such days. While many such cases can be found if one searches long enough, they alone provide no evidence whatsoever of the validity of the theory. Before concluding that biorhythm has anything to do with such events, one must take into account the number of times such events take place when biorhythm theory predicts they *won't*. Such cases are conveniently ignored by biorhythm proponents.

Seemingly more impressive evidence for biorhythm theory comes from studies that claim to show that an impressive number of accidents occur on critical days when compared with the number of occurrences expected by chance. Such studies are often (1) impossible to find, and thus impossible to verify; (2) contain only an assertion that a significant effect of biorhythm was found without providing sufficient detail to check the claims; or (3) contain grievous methodological and/or statistical errors, rendering the conclusions drawn from the data worthless.

Regarding the first type of study, the kind that are impossible to find, the most widely cited supposedly were carried out in Japan and found that about 60 percent of accidents fell on critical days. But Katz (1977) states that the *Toronto Star* "was unable to locate any of the original studies referred to by the biorhythm promotional literature. The Japanese Embassy in Washington, D.C., the Japanese Trade Center and the Japanese Chamber of Commerce in New York all stated that they were unaware of any Japanese firms employing biorhythm." Another example of what might be termed a "phantom study" was cited by Pittner and Owens (1975): "The Canadian Armed Forces concluded after a 7,000 case study that there is a definite relationship between accidents and critical days" (p. 44). Unfortunately, no reference for this study was given. Colonel J. Boulet, director of information services for the Canadian Department of National Defense, in a letter to me dated July 20, 1978, stated: "A search to locate the report of the biorhythm theory study allegedly carried out by the Canadian Forces proved negative."

A report by Anderson (1973) is an example of the "assertion only" type of study claiming to support biorhythm theory. Anderson devotes only one paragraph of his four-and-a-half-page paper to his claim that "we have analyzed more than 1,000 accidents during the past two years, and the amazing thing is that we have come out with more than 90 percent of the accidents occurring on critical days" (p. 19). Anderson presents no information whatsoever on the method used for picking the analyzed accidents, the method for computing critical days (a most important point, to be discussed later), or any other details of how the results were arrived at.

Finally, I will give two examples of studies claiming to support biorhythm theory that present a more detailed description of the methods of data analysis used. These studies contain errors that totally invalidate the conclusions drawn from the data. The first is by Pittner and Owens (1975). These authors analyzed accidents involving human error from the records of the Safety Office of the Army Corps of Engineers, Philadelphia District, for fiscal years 1971 through 1974. "A total of 51 accidents were computed; and of these, approximately 35 percent (18 accidents) occurred on critical days" (p. 45). If this finding were true, it would be supportive of biorhythm theory, for it is significantly different from chance. Happily, Pittner and Owens included a tabulation of the day on each of the three biorhythm cycles on which each accident occurred (their Figure A, p. 44). An examination of their raw data shows, amazingly, that only 13, not 18, accidents occurred on critical days. The number of accidents out of 51 that should fall on critical days by chance alone is 12. The chi-square for the occurrence of 13 accidents results in a figure of $\chi^2 = 0.11$ ($df = 1, p < .85$). This is not even close to being significantly different from chance. Thus, the actual results of the Pittner and Owens study show no support for biorhythm theory at all, in spite of what the authors, incorrectly, claimed their data showed. Unfortunately, Pittner and Owens's erroneous conclusions have been reported elsewhere (Brownley and Sandler, 1977) as supporting biorhythm theory.

Where did the extra five critical-day accidents come from in Pittner and Owens's study? Clearly it is not just a misprint, since 35 percent of 51 is approximately 18. These authors may have done what is fairly common in biorhythm studies; they must have included not only critical days but also one day before and one day after critical days (critical day plus and minus one). That is done because "an individual born shortly following midnight is actually biorhythmically closer to the preceding day than an individual born at noon. Similarly, an individual born approaching midnight is closer to the coming day" (Williamson, 1975, p. 18). As long as such a procedure is made explicit, there are no problems. However, it is easy for those not trained in statistical methodology to include accidents falling on the critical day plus and minus one and then compare the total figure to the number of accidents expected to fall only on the actual critical day by chance. Such a procedure obviously results in a serious error with a seemingly very impressive number of critical-day accidents, a number much higher than expected by "chance" when the chance figure that is used is that for a single critical day. It is interesting to note that about 60 percent of a random sample of accidents will fall on a critical day plus and minus one by chance alone. Many of the phantom studies said to support biorhythm noted above claim that about 60 percent of accidents occur on critical days.

Williamson falls directly into this trap. After stating that "critical days comprise only 20 percent of the total," he says, "Days considered to be critical are the calculated critical days plus or minus one." He then evidences surprise that out of 33 accidents, 58 percent fell on a critical day. Of 13 helicopter accidents, 61 percent occurred on the pilots' critical days. Since "critical day" here means the actual critical day plus and minus one, these results are exactly what would be expected by chance alone and show no support for biorhythm theory.

Another statistical problem in some biorhythm studies is what may be called the "shotgun" approach. In such a study, the investigator tests all possible biorhythm predictions and, when one or two turn out to be verified by statistically significant differences in the data, he claims that this supports biorhythm theory. It does not. Consider a paper by Knowles and Jones (1974). These authors examined the incidences of altercations between police and suspects for any biorhythm effects. When comparisons were made regarding the occurrence of such incidents on officers' critical days, no significant effects were found. However, the authors then went on: "All relationships of patterns of days and periods for each of the three cycles" were examined for both officer and suspect. The author can't mean this literally as there is a simply huge number of different such patterns. Even considering the simplest cases, a given rhythm can be in one of five different patterns: (1) up phase, on ascending portion of curve; (2) up phase, descending portion; (3) down phase, ascending portion; (4) down phase, descending portion; and (5) critical. Since there are three rhythms and two persons involved in each altercation, that gives $5^6$ or 15,625 different possible patterns to be examined. Knowles and Jones never state exactly how many patterns they examine, but since they apparently had access to a computer it may have been a great many. Thus the fact that they found significant effects on four comparisons out of however many they ran is really not terribly supportive of biorhythm theory. It is even less supportive when one remembers that the major claims of the theory, regarding critical days, were not confirmed.

Thus it appears that the evidence claiming to support biorhythm theory does not stand up to close inspection.

## Studies Failing to Support Biorhythm Theory

With the great popularity of biorhythm theory, a number of attempts have been made to assess its validity using adequate (and often quite elegant) statistical and experimental paradigms. I shall now review these studies. They uniformly offer no support whatsoever for the claims of biorhythm enthusiasts.

*Accident occurrences.* A fairly early study of biorhythm and accidents was carried out by Mason (1971) for the Workers' Compensation Board of British Columbia. Mason examined 13,285 accidents from the Board's files. This included all time-loss accidents occurring during the first four months of 1971. Accidents were no more likely to occur on critical days than on noncritical days. Further, various combinations of critical and noncritical days did not yield accident rates higher than chance. A possible criticism of these results is that the sample included all accidents, not just those due to human error, and that the inclusion of accidents not caused by human error reduced the effect of biorhythms. Two points answer this criticism. First, the addition of other than human-error accidents could be expected to weaken any effects of biorhythms but not to eliminate it totally. After all, human error plays some role in a large percentage of all accidents. Second, when the entire sample of accidents was divided into those more likely to be the result of human error and those less likely, no effects of biorhythm were found for either subsample.

Sacher (1974) performed a study of the effects of biorhythms on aircraft mishaps, using 4,346 accidents involving naval aircraft between 1968 and 1973. Again, no significant effects of pilots' position on the various biorhythm cycles were found.

Nett (1975) studied 400 accidents that occurred at two Army Materiel Command installations. Nett's study is interesting in that he used six different methods for calculating critical days. He then compared the number of accidents occurring at each of the two AMC installations on seven types of days (critical on any cycle; critical on a given cycle; multiple critical days) with that expected by chance. This resulted in 42 different tests of biorhythm theory for each facility. Only for one such facility did any of the 42 tests reach the 5 percent level of significance, indicating that such an event should occur by chance only once in twenty times. However, since it will be recalled that there were 42 separate tests, the occurrence of an event expected by chance one in twenty times offers no support for biorhythm theory.

Weaver (1974) studied 25 percent of the Army aviation accidents involving pilot error that occurred over a two-and-a-half-year period starting in 1971. He claimed that 49 percent of these accidents occurred on critical days. Unfortunately, this study is an example of the assertion-only type, and Weaver did not even report how many accidents were included. More adequately described studies of aircraft accident occurrences have failed to find any biorhythmic effects. Wolcott, McMeekin, Burgin, and Yanovitch (1975, 1977a, 1977b) have examined a total of 9,505 aircraft accidents, both civilian and military, and have found no biorhythm effects. Khalil and Kurucz (1977) found no biorhythm effects in their sample of 63 general aviation accidents.

Turning from aircraft to other types of accidents, Khalil and Kurucz also looked for biorhythm effects on automobile accidents. There were no such effects in a sample of 181 accidents where the driver was at fault. In perhaps the most elegant study of biorhythms to date, Shaffer, Schmidt, Zlotowitz, and Fisher (1978) examined 205 highway accidents and found no hint of any effects of biorhythm. This study is a model for the careful statistical evaluation of the biorhythm theory. Carvey and Nibler (1977) investigated 150 "work-related" vehicular accidents. No biorhythm effects were found. Brownley and Sandler (1977) examined 506 fatal driving accidents. No biorhythm effects were found.

Several studies have investigated the alleged effects of biorhythms by examining industrial accidents. Lyon, Dyer, and Gary (1978) found no such effects in a sample of 112 accidents occurring at the Oak Ridge National Laboratory. A subsample of 67 accidents where the victim was obviously at fault also revealed no biorhythm effects. Persinger, Cooke, and Janes (1978) found no biorhythm effect on 400 coal mine accidents. Carvey and Nibler likewise found no biorhythm effect in a sample of 210 on-the-job accidents for which workmen's compensation was requested. Thus, over 25,000 accidents have been examined with no sign of biorhythm effects being found.

*Sports Performance.* Some investigators have looked at the possibility that biorhythms have an effect on variables other than accident occurrences. One of the areas where biorhythm is used widely is sports performance. As with studies of accident occurrences, studies of biorhythm effects on sports performance have failed to demonstrate such effects. Khalil and Kurucz (1977) failed to find biorhythm effects on the performance of the University of Florida swim team or the faculty-student bowling team. Louis (1978) found no biorhythm effects on the occurrence of 100 no-hit baseball games between 1934 and 1975. Fix (1976) found no biorhythm effects on the batting performance of 70 major league baseball players during the 1975 season. There was no effect either when players were considered as a group or when each player's performance on, for example, a down day was compared to his performance on an up day. Schonholzer, Schilling, and Muller (1972) found no biorhythm effects on the occurrence at 1,051 record sports performances. Bainbridge (1978) examined the performance of golfers, both male and female, and found no biorhythm effects in the male golfers. He did find an effect of slight significance for the female golfers. However, since this is the only report of significant biorhythm effects on sports performance out of the dozens examined, it cannot be taken too seriously.

*Other Variables.* Turning to studies of biorhythm effects on other variables, five papers report attempts to correlate human moods with positions on the various biorhythm curves. One obvious prediction would be that mood should be most strongly under the control of the 28-day emotional cycle, with people reporting better feelings on up days than on down days. None of these five papers report any evidence to support biorhythm theory (Dorland and Brinker, 1973; Rodgers, Sprinkle, and Lindberg, 1974; Whitton, 1977; Wright, 1977; Steer, 1978). In her 1974 doctoral dissertation, Yates studied the effects of biorhythms on performance on four paper-and-pencil psychological tests measuring mood, motor performance, and intellectual performance. Ninety-six students, both male and female, served as subjects. No biorhythm effects were found on any of the measures used.

Hersey's studies (1931, 1932, 1955) of workers' emotions and their relation to on-the-job productivity are often cited as supporting biorhythm theory. In fact, this research clearly contradicts the theory's basic assumption. Hersey asked hundreds of workers to rate their moods on an 11-point scale over long periods of time. He then examined these ratings for any cyclic fluctuations. He did find that moods do show cyclic changes. However, there were large differences both within and across individuals. In one study (Hersey, 1932) the mean length of the mood cycle was 34.6 days but varied from 21 to 65 days for different individuals. A given individual's rhythm would also change greatly over time because of various environmental factors. No support for biorhythm there!

Bailey (1978) examined the deaths of presidents of the United States for biorhythm effects. Of the 35 presidents who have died, 8 have died on single critical days and 2 on double critical days. This is not significantly different from chance ($\chi^2 = 3.32$, $df = 1$, $p > .05$).

Neil and Sink (1976) had three subjects perform a choice reaction-time task daily for 70 days. Three measures were derived from a subject's performance: reaction time, movement time, and the rate at which information was transmitted by the subject. Data from each subject for each measure were Fourier analyzed to "identify periodicities in performance." Twelve significant periodicities were found, some that were close to either one of the biorhythm cycles or a multiple thereof. However, since the periods that were significant varied from subject to subject and from measure to measure, these data provide no support for biorhythm theory.

Two more-detailed analyses of reaction-time performance in relation to biorhythm theory have been carried out. Wolcott, Hanson, Foster, and Kay (1979) found no biorhythm effects on a choice reaction-time task.

Hines (1978) examined data from a study by Fozard, Thomas, and Waugh (1976). Data from this study consisted of reaction times and error rates in a choice reaction-time task from 111 of Fozard et al.'s male subjects. Scores for 112 of these subjects on the Ammons Quick Test (Ammons and Ammons, 1962), a short IQ test, were also available. The large number of subjects in this study permitted comparisons to be made between critical- and noncritical-day performance.

The data from Fozard et al. showed no differences in performance between up days and down days for any of the three measures (reaction time, error rate, Ammons IQ) used. Likewise, there were no effects of the number of rhythms in the up phase or down phase on any of the three measures. Only the analysis of critical versus noncritical days showed a single significant difference. Reaction times on emotionally critical days were slower than on emotionally noncritical days (450 msec. versus 396 msec.; $t(109) = 2.76, p < .01$). This represents the only significant difference out of a total of 21 differences examined. It thus offers no support for biorhythm theory, being due rather to the fact that if enough differences are examined, even from a set of random data, some will be "significant" by chance alone.

Hines also examined data from a study of aging by Hines and Posner (1976), which consisted of scores on three subscales of the Wechsler Adult Intelligence Scale (WAIS), a standard adult IQ test. Scores for a total of 65 subjects, 40 females and 25 males, were examined. The three subscales used were Digit Span, Block Design, and Vocabulary. Because of the relatively small number of subjects, comparisons of performance on critical and noncritical days could not be made—too few subjects were tested on critical days for meaningful results. Analysis of the data from Hines and Posner showed no differences in performance between up days and down days on any of the three subscales for any of the three biorhythms. A further comparison examined the effects of the total number of rhythms in the up or the down phase on the day the subjects were tested. On a given day a person can be in one of four conditions, depending on the phases of his or her three biorhythms. All three rhythms can be up, two can be up and one down, one can be up and two down, or all three can be down. Biorhythm theory predicts that as the number of rhythms in the down phase increase, performance should decrease. No such trend was found for any of the three WAIS subscales used.

Finally, Bainbridge (1978) has looked for biorhythm influences on several miscellaneous variables. He found none. Specifically, he found no effects of either the physical or the emotional cycle on the day of death for 274 baseball pitchers. Nor were there any such effects on the days on which 565 mothers gave birth or on the sex of their infants. The intellectual cycle had no effect on test performance of two samples of students from Bainbridge's classes, one sample of 105 students and one of 150. Khalil and Kurucz also found no biorhythm effect on a sample of 105 miscellaneous deaths.

The conclusion of the numerous well-done studies that have examined the validity of biorhythm theory is clear—there is no evidence to support the theory. This should not be surprising, since, although there are many well-documented biological rhythms (not biorhythms) in both humans and animals (Bunning, 1973; Saunders, 1977), none are of the fixed, mechanical, and unchangeable type that the three biorhythm cycles are supposed to be. Even the menstrual cycle, the best known of the human cycles, is highly variable both within a given woman and across different women (Matsumoto, Nogami, and Ohkuri, 1962). Further, this cycle has almost no effect on cognitive and motor performance (Sommer, 1973).

## References

Ammons, R., and C. Ammons 1962. "The Quick Test (QT): Provisional Manual." *Psychological Reports* 11: 111-161.

Anderson, R. 1973. "Biorhythm—Man's Timing Mechanism." *American Society of Safety Engineers Journal* 18 (2): 17-21.

Bailey, K. 1978. "Biological Time and Political Behavior." Paper presented at the Annual Meeting of the American Political Science Association, New York, September.

Bainbridge, W. 1978. "Biorhythms: Evaluating a Pseudoscience." *Skeptical Inquirer* 2 (2): 40-56.

Brownley, M., and C. Sandler 1977. "Biorhythm—An Accident Prevention Aid?" In A. Neal and R. Palasek, eds., *Proceedings of the Human Factors Society 21st Annual Meeting*. Santa Monica, Calif.: Human Factors Society, pp. 188-192.

Bunning, E. 1973. *The Psychological Clock*, rev. 3rd ed. London: English Universities Press.

Carvey, D., and R. Nibler 1977. "Biorhythmic Cycles and the Incidence of Industrial Accidents." *Personnel Psychology* 30: 447-454.

Dorland, J., and N. Brinker 1973. "Fluctuations in Human Mood (A Preliminary Study)." *Journal of Interdisciplinary Cycle Research* 4: 25-29.

Fix, A. 1976. "Biorhythms and Sports Performance." *Zetetic* 1 (1): 52-57.

Fozard, J., J. Thomas, and N. Waugh 1976. "Effects of Age and Frequency of Stimulus Repetitions on Two-Choice Reaction Time." *Journal of Gerontology* 31: 556-563.
Gardner, M. 1966. "Mathematical Games." *Scientific American* 215 (1): 108-112.
Hersey, R. 1931. "Emotional Cycles in Man." *Journal of Mental Science* 77: 151-169.
—— 1932. *Workers' Emotions in Shop and Home*. Philadelphia: University of Pennsylvania Press.
—— 1955. *Zest for Work*. New York: Harper & Bros.
Hines, T. 1978. "Lack of Biorhythmic Effects on Three WAIS Subscales, the Ammons IQ Test, and Reaction Time and Error Rate in a Choice Reaction Time Task." Submitted for publication.
Hines, T. and M. Posner 1976. "Slow But Sure: A Chronometric Analysis of the Process of Aging." Paper presented at the Annual Meeting of the American Psychological Association, Washington, D.C., September.
Katz, S. 1977. "Biorhythm: Guide to Life or Fad for 'Numerical Nuts'?" *Toronto Star*, April 2, p. A3.
Khalil, T., and C. Kurucz 1977. "The Influence of Biorhythm on Accident Occurrence and Performance." *Ergonomics* 20: 389-398.
Knowles, L., and R. Jones 1974. "Police Altercations and the Ups and Downs of Life Cycles." *Police Chief* (Nov.): 51-54.
Louis, A. 1978. "Should You Buy Biorhythms?" *Psychology Today* 11 (11): 93-96.
Lyon, W., F. Dyer, and D. Gary 1978. "Biorhythm: Imitation of Science." *Chemistry* 51 (3): 5-7.
Mason, K. 1971. *An Investigation of the Biorhythm Theory*. Vancouver, British Columbia: Workers' Compensation Board.
Matsumoto, S., Y. Nogami, and S. Ohkuri 1962. "Statistical Studies on Menstruation: A Criticism of the Definition of Normal Menstruation." *Gumma Journal of Medical Science* 11: 294-318.
Neil, D., and F. Sink 1976. "Laboratory Investigation of 'Biorhythms.'" *Aviation, Space, and Environmental Medicine* 47: 425-429.
Nett, D. 1975. *A Study of the Relationship of Biorhythms to Accidents at Two AMC Installations*. Texarkana, Texas: Army Materiel Command (NTIS #AD-A009 319).
Persinger, M., W. Cooke, and J. Janes 1978. "No Evidence for Relationships Between Biorhythms and Industrial Accidents." *Perceptual and Motor Skills* 46: 423-426.
Pittner, E., and P. Owens 1975. "Chance or Destiny? A Review and Test of the Biorhythm Theory." *Professional Safety* (April): 42-46.
Rodgers, C., R. Sprinkle, and F. Lindberg 1974. "Biorhythms: Three Tests of the Predictive Validity of the 'Critical Days' Hypothesis." *International Journal of Chronology* 2: 247-252.
Sacher, D. 1974. *Influence of Biorhythmic Criticality on Aircraft Mishaps*. Monterey, Calif.: Naval Postgraduate School (NTIS #AD-783 817).
Saunders, D. 1977. *An Introduction to Biological Rhythms*. New York: Halsted Press.
Schonholzer, G., G. Schilling, and H. Muller 1972. "Biorhythmik." *Schweizerische Zeitschrift fur Sportmedizin* 20: 7-27.
Shaffer, U., C. Schmidt, H. Zlotowitz, and R. Fisher 1978. "Biorhythms and Highway Crashes." *Archives of General Psychiatry* 35: 41-46.

Sommer, B. 1973. "Effect of Menstruation on Cognitive and Perceptual-Motor Behavior: A Review." *Psychosomatic Medicine* 35: 515-534.
Steer, R. 1978. "Moods and Biorhythms of Heroin Addicts." *Psychological Reports* 43: 829-830.
Weaver, C. 1974. "Biorhythms: The Question of Ups and Downs." *U.S. Army Aviation Digest* (January): 13-17.
Whitton, J. 1977. "An Empirical Study of Biorhythm in Humans." *New Horizons* 2 (3): 32-35.
Williamson, T. 1975. "Cancel Today and Save Tomorrow!" *Airscoop* (March): 18-20.
Wolcott, J., C. Hanson, W. Foster, and T. Kay 1979. "Correlation of Choice Reaction Time Performance with Biorhythmic Criticality and Cycle Phase." *Aviation, Space, and Environmental Medicine* 50: 34-39.
Wolcott, J., R. McMeekin, R. Burgin, and R. Yanowitch 1975. "Biorhythms—Are They a Waste of Time?" *TAC Attack* (November): 4-9.
—— 1977a. "Correlation of Aircraft Accidents with Biorhythmic Criticality and Cycle Phase in U.S. Air Force, U.S. Army, and Civil Aviation Pilots." *Aviation, Space, and Environmental Medicine* 48: 976-983.
—— 1977b. "Correlation of General Aviation Accidents with the Biorhythm Theory." *Human Factors* 19: 283-293.
Wright, M. 1977. "Biorhythm: Fact or Fancy." In A. Neal and R. Palasek, eds., *Proceedings of the Human Factors Society, 21st Annual Meeting*. Santa Monica, Calif.: Human Factors Society, pp. 193-196.
Yates, M. 1974. *Study of Biorhythms with Students in Four Fraternities and Four Sororities at the University of Wyoming*. Unpublished doctoral dissertation, University of Wyoming (Xerox University Microfilms #75-244). •

## Knowledge from the subconscious

*It is a very common event for a dream to give evidence of knowledge and memories which the waking subject is unaware of possessing. One of my patients dreamt . . . that he ordered a "Kontuszowka" while he was in a café. After telling me this, he asked me what a "Kontuszowka" was, as if he had never heard the name. I was able to tell him in reply that it was a Polish liqueur, and that he could not have invented the name as it had long been familiar to me from advertisements on the billboards. At first he would not believe me; but some days later, after making his dream come true in a café, he noticed the name on a billboard at a street corner which he must have gone past at least twice a day for several months.*

—Freud, *The Interpretation of Dreams*