

LATERALITY OF HYPNOTIC RESPONSE^{1,2}

LAURA L. OTTO-SALAJ

Temple University

ROBERT NADON

Brock University, St. Catharines, Ontario, Canada

IRENE P. HOYT, PATRICIA A. REGISTER, AND

University of Wisconsin, Madison

JOHN F. KIHLSSTROM^{3,4}

University of Arizona, Tucson

Abstract: In an investigation of hemispheric activity during hypnosis, a total of 1269 Ss received hypnotizability scales containing suggestions targeting the left or right side of the body. There were no consistent differences in response strength on the left compared to the right side. Nor were there differences in hypnotizability between right- and left-handed (and ambidextrous) Ss, or between Ss who sat on the left versus right side of the testing room. Definitive evidence of lateralized cerebral activity associated with hypnosis and hypnotizability can only come from direct neuropsychological, electrocortical, or brain-imaging investigations.

Hypnosis is most commonly studied in terms of its associated cognitive and social processes, or in terms of the personality correlates of hypnotizability. But at least since the time of Charcot, investigators have speculated about the biological substrates of the phenomenon. For example, the discovery of hemispheric specialization has led to the proposal that

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⁴Reprint requests should be addressed to Laura L. Otto-Salaj, M.A., Department of Psychology, Temple University, Philadelphia, Pennsylvania 19122; or John F. Kihlstrom, Ph.D., Amnesia and Cognition Unit, Department of Psychology, University of Arizona, Tucson, Arizona 85721 (Bitnet: KIHLSSTRM@ARIVRVAX), to whom requests for a fuller version of this paper, documenting the analysis of handedness and seating-position effects, should be addressed.

hypnosis and hypnotizability are mediated by the activity of the right hemisphere (for reviews, see Bakan, 1969; Crawford, 1989; De Pascalis, 1989; Graham, 1977; R. C. Gur & R. G. Gur, 1974; Sabourin, 1982).

Sackeim (1982), following up on an observation made by Galin and his colleagues (Galín, Diamond, & Braff, 1977) that symptoms of conversion disorder were more frequently found on the left side of the body (see also Stern, 1977), found that hypnotic Ss given motor suggestions responded more strongly on the left sides of their bodies — that is, the side controlled by the motor area of the right cerebral hemisphere. By contrast, left-handed and ambidextrous Ss were more responsive on the right side. To date, however, there has been no published attempt to confirm this extremely interesting observation. The present study was intended as a conceptual replication of this study (Sackeim, 1982), in which the present authors took the opportunity to collect related data on the relations among handedness, sex of S, seating position, and hypnotizability.

METHOD

Subjects

The present study is based on a total of 1269 college students (753 females, 516 males) who volunteered for a study concerned with individual differences in hypnotizability. The Ss were tested in group sessions (average group size = 105) lasting approximately 1.5 hours. In return for their participation, they received points toward the extra credit option in their introductory psychology course. Of these 1269 Ss, a total of 1143 (90.1%) identified themselves as right-handed, 88 (6.9%) as left-handed, and the remaining 38 (3.0%) as ambidextrous.

Procedure

The Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A) of Shor and E. Orne (1962) consists of an induction of hypnosis accompanied by a series of 12 representative hypnotic experiences. In the original version of HGSHS:A, 4 of these 12 suggestions involve directions for responses on a specific side of the body on the part of S: 3 items call for responses on the left side of the body (Item 3, Arm Lowering; Item 6, Arm Rigidity; and Item 11, Posthypnotic Ankle Touch), while the remaining suggestion calls for a response on Ss' right side (Item 4, Arm Immobilization). For the present experiment, a modified version of HGSHS:A was constructed in which the side of the body targeted by each of these 4 lateralized suggestions was reversed. Thus, the modified version consisted of 3 lateralized items targeting the right side of the body (Items 3, 6, and 11), and one item targeting the left side of the body (Item 4), plus the remaining 8 nonlateralized items.

Audiotape recordings of both versions of HGSHS:A were made on studio equipment by a professional announcer who was blind to the hy-

pothesis of the experiment. The original and modified forms of HGSHS:A were administered to separate S groups, in counterbalanced order, until data collection was completed.

In addition to the rewording of the four lateralized suggestions, a number of revisions were made to the item-scoring procedure of HGSHS:A.

Behavioral scores. As in the standard form, Ss rated their response to each suggestion according to dichotomized behavioral criteria. Posthypnotic amnesia, however, was scored according to the revised criterion proposed by Kihlstrom and Register (1984).

The Ss completed two other self-ratings of response to each item.

Subjective success. Following the procedure employed by Register and Kihlstrom (1986), Ss were asked to indicate on a 4-point Likert scale whether they had successfully experienced each of the 12 suggestions (the meaning of "success" was not further defined for Ss).

Involuntariness. Following the procedure of Bowers (1982), Ss were asked to rate on a 5-point Likert-type scale the degree to which their behavioral response to each suggestion was experienced as involuntary.

Ratings of subjective success were completed before the behavioral self-ratings, ratings of involuntariness afterwards.

RESULTS

Ignoring the four lateralized items, the two versions of HGSHS:A were closely comparable in terms of total behavioral ($\bar{X} = 4.54$, based on a maximum possible of 8 points), subjective ($\bar{X} = 14.09$, maximum = 32), or involuntariness ($\bar{X} = 28.31$, maximum = 40) scores (all $F < 1$).

Any study of hemispheric specialization must take into account the fact that cerebral organization varies as a function of both sex and handedness. Males, especially right-handed males, appear to be more strongly lateralized than other segments of the population (Segalowitz, 1983; Springer & Deutsch, 1989). For this reason, the present experiment is best construed as a $2 \times 2 \times 3$ factorial ANOVA, with three between-groups factors: version of the suggestion, targeting the right versus left side of the body; S sex, female versus male; and S handedness, right versus left versus ambidextrous.

Lateralization of Hypnotic Response

Table 1 shows the proportion of Ss in each of the four groups passing each of the lateralized items according to the standard behavioral criterion. The four items were analyzed by a factorial MANOVA followed by separate factorial ANOVAs with two between-group variables, version and sex. There was a significant multivariate sex main effect ($F = 6.46$, $df = 4, 1262$; $p < .001$) and significant univariate sex differences in response to each of the items (all $p < .05$) reflecting the frequently found (but not ubiquitous) sex difference in hypnotizability (for a review, see

TABLE 1
LATERALIZED RESPONSE TO HYPNOTIC SUGGESTIONS

Item and Criterion	Side of Body Targeted by Suggestion			
	Left		Right	
	Females	Males	Females	Males
<i>N</i>	373	261	380	255
<i>Hand Lowering (Item 3)</i>				
Behavioral	0.84	0.79	0.85	0.82
Success	2.65	2.44	2.67	2.49
Involuntariness	4.35	4.16	4.42	4.24
<i>Arm Immobilization (Item 4)</i>				
Behavioral	0.52	0.43	0.56	0.46
Success	2.09	1.90	2.11	1.90
Involuntariness	3.63	3.46	3.63	3.48
<i>Arm Rigidity (Item 6)</i>				
Behavioral	0.58	0.46	0.57	0.54
Success	1.80	1.64	1.82	1.73
Involuntariness	3.49	3.46	3.47	3.47
<i>Ankle Touching (Item 11)</i>				
Behavioral	0.41	0.30	0.43	0.40
Success	0.86	0.56	0.92	0.72
Involuntariness	2.18	2.06	2.31	2.29

Kihlstrom, Diaz, McClellan, Ruskin, Pistole, & Shor, 1980). There was also a significant multivariate main effect for version ($F = 2.81$, $df = 4, 1262$; $p < .05$). Significant univariate differences between the left- and right-sided versions, however, were found only for Item 11, Posthypnotic Suggestion ($F = 6.75$, $df = 1, 265$; $MS_e = .24$, $p < .01$): the rate of behavioral response was higher when the suggestion targeted the right ankle. This main effect was qualified somewhat by a trend toward an interaction between version and sex ($F = 3.02$, $df = 1, 1265$; $p = .08$). Examination of this interaction revealed that the rate of response tended to be suppressed in males receiving the version targeting the left ankle, compared to other S groups.

For subjective success (see Table 1), there was a significant multivariate effect for sex ($F = 8.91$, $df = 4, 1262$; $p < .001$) and each item again yielded a significant sex difference ($p < .05$). There was no multivariate main effect for version and the univariate difference between versions approached statistical significance only for the posthypnotic suggestion ($F = 3.02$, $df = 1, 1265$; $MS_e = 1.27$, $p = .08$); the sex-by-version interaction did not approach significance ($F < 1$). The suggestion targeting the right ankle tended to be rated as more successful.

For involuntariness (see Table 1), there was a significant multivariate effect for sex ($F = 3.04$, $df = 4, 1262$; $p < .02$), although there were significant univariate sex differences on only two of the Items, 3 (Arm Lowering) and 4 (Hand Catalepsy). There was no multivariate effect for

version ($F = 1.75$; $df = 4, 1262$; $p > .10$), although, again, touching the right ankle was experienced as more involuntary ($F = 5.25$, $df = 1, 1265$; $MS_e = 1.81$, $p < .05$); this was true for both males and females ($F < 1$). Touching the right ankle in response to the posthypnotic suggestion was experienced as more involuntary.

Analysis of right-handed Ss. The same pattern of findings was obtained in a reanalysis of the data limited to the 1143 right-handed Ss. For behavioral response, MANOVA revealed a main effect for sex ($F = 6.52$, $df = 4, 1136$; $p < .001$); a main effect for version ($F = 3.15$, $df = 4, 1136$; $p < .02$); but no sex-by-version interaction. The univariate analysis of the posthypnotic suggestion showed a marginally significant effect of sex ($F = 3.79$, $df = 1, 1139$; $MS_e = .24$, $p = .05$); and a clearly significant effect of version ($F = 7.85$, $df = 1, 1139$; $p = .01$); the sex-by-version interaction approached significance ($F = 2.78$, $df = 1, 1139$; $p = .10$). Although the other three items showed significant sex differences, none of the other effects approached significance.

For subjective success, there was a multivariate main effect for sex only ($F = 8.62$, $df = 4, 1136$; $p < .001$); each item also showed a significant sex effect (all $p < .05$). The difference between versions only approached significance for the posthypnotic suggestion ($F = 2.42$, $df = 1, 1139$; $MS_e = 1.28$, $p = .12$); the interaction did not approach significance ($F < 1$).

For experienced involuntariness, there was a multivariate main effect for sex ($F = 3.30$, $df = 4, 1136$; $p = .01$) and a marginally significant effect for version ($F = 2.14$, $df = 4, 1136$; $p < .10$). The difference between versions was significant only for the posthypnotic suggestion ($F = 7.41$, $df = 1, 1139$; $MS_e = 1.82$, $p < .01$); the interaction was not significant ($F < 1$).

Analysis of right-handed males. The same pattern of results was also observed when the analysis was confined to the 454 right-handed males. For the behavioral scores, there was a significant multivariate effect of version ($F = 3.09$, $df = 4, 449$; $p < .02$), although a significant difference between versions appeared only for the posthypnotic suggestion: behavioral response ($F = 8.64$, $df = 1, 452$; $MS_e = .23$, $p < .005$); experienced involuntariness ($F = 4.01$, $df = 1, 452$; $MS_e = 1.69$, $p < .05$). Ratings of subjective success showed the same trend, although the difference was not statistically significant ($F = 1.78$, $df = 1, 452$; $MS_e = 1.12$, $p = .18$). No other effects approached statistical significance.

Analysis of hypnotizable Ss. The same pattern of results was obtained when the analysis was confined to those 415 Ss scoring 6-8 on the eight-item form of HGSHS:A created by counting only the nonlateralized items (this cutoff corresponds to the top 33% of the distribution). For the three MANOVAs, there were no main effects for version. Again, the only item to show significant univariate differences between versions was Item 11,

Posthypnotic Suggestion: behavioral ($F = 1.66$, $df = 1,411$; $p < .20$); subjective ($F = 6.04$, $df = 1,411$; $p < .05$); involuntariness ($F = 4.22$, $df = 1,411$; $p < .05$).

Analysis of passed items. Sackeim's (1982) original analysis focused on lateral differences in intensity of response to suggestions that were passed by objective criteria. Thus, for example, for Ss passing the hand lowering item (analogous to Item 3 of HGSHS:A), intensity of response was greater in the left than the right hand. Accordingly, the data from this experiment were reanalyzed considering only those Ss who passed each of the four lateralized items, and comparing the left- and right-side groups in terms of subjective success and experienced involuntariness.

A total of 1038 Ss (81.8% of the total sample) passed the objective criterion for Item 3, Hand Lowering. There was no significant difference, however, in degree of subjective success or experienced involuntariness between the two groups (both $F < 2$). Similar findings were obtained for Item 4, Arm Immobilization ($N = 636$, both $F < 1$); for Item 6, Arm Rigidity ($N = 683$, both $F < 1$); and for Item 11, Posthypnotic Suggestion ($N = 505$, both $F < 2$). This pattern of results was unchanged when the analysis was further restricted to right-handed Ss, and to right-handed males.

Subsidiary Analyses

No effects on hypnotic response were found for handedness per se, or for right- or left-side seating position.⁵

DISCUSSION

In the present experiment, substantial evidence of lateralization of hypnotic response was obtained on only one of the four items tested. For this item, response was greatest to a suggestion targeting the right, as opposed to the left, ankle. This finding was consistently obtained, regardless of whether response was defined by the behavioral criterion, subjective success, or experienced involuntariness. It should be noted, however, that this single positive result actually goes against the laterality hypothesis. That is, response favored the right ankle, which projects to the left cerebral hemisphere. Thus, the present study did not confirm the finding of Sackeim (1982) that response to hypnotic suggestions is stronger on the left side of the body.

⁵Full documentation of these findings, as well as an expanded version of the present paper, providing literature reviews and statistical analyses relevant to handedness and seating position, have been deposited with the National Auxiliary Publications Service (NAPS). For 55 pages order document No. 04903 from ASIS-NAPS, c/o Microfiche Publications, P.O. Box 3513, Grand Central Station, New York, NY 10163-3513. Remit in advance, in U.S. funds only, \$8.25 for photocopies or \$4.00 for microfiche and make checks payable to Microfiche Publications — NAPS. Outside the United States and Canada, add postage of \$8.50 for a photocopy and \$1.75 for a fiche. There is a \$15.00 invoicing fee for orders not prepaid; this includes PO#s.

In evaluating these null results, it should be pointed out that the present study differed from Sackeim's (1982) in many ways. It used a group, rather than individual, hypnotic procedure; a between-groups, rather than a within-Ss, design; only four, as opposed to nine, lateralized test suggestions; and Ss were classified only in terms of sex and handedness, and not eyedness and family history of laterality as well. Nevertheless, it should be noted that Sackeim (1982) obtained positive results in an item-by-item analysis that considered only handedness; considerations of sex and eye dominance only magnified his effect. Perhaps most important, the present experiment relied on Ss' self-reports of behavioral response, subjective success, and experienced involuntariness, while Sackeim's analyzed objectively observed behavior. It is possible that the laterality differences obtained by Sackeim are not represented in conscious awareness, and thus are not reportable by Ss. It should be noted, however, that the present study, which employed almost 15 times the number of Ss as the original (Sackeim, 1982), certainly had enough power to detect even very small differences in the experience of right- and left-lateralized suggestions.

This is not to say that the laterality hypothesis of hypnosis should now be rejected, or denied future study. There do appear to be certain aspects of hypnotic experience that have a "right-hemisphere" quality to them (e.g., Crawford, 1989; Graham, 1977; Sabourin, 1982). On the other hand, it should be noted that hypnotic experiences arise as a result of verbal suggestion, the processing of which is mediated by language centers localized in the left hemisphere. While the laterality hypothesis should remain an open question, it seems likely that the neuropsychological underpinnings of hypnosis are more complicated than a simple matter of left versus right hemisphere, and that definitive evidence will be provided only by direct measurement of brain functions through electrocortical or brain-imaging techniques, or perhaps through lesion evidence.

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Seitliche Beanspruchung bei der Hypnoseleistung

Laura L. Otto-Salaj, Robert Nadon, Irene P. Hoyt, Patricia A. Register
und John F. Kihlstrom

Abstrakt: Bei einer Untersuchung der hemisphärischen Aktivität während der Hypnose unterzog sich eine Summe von 1269 Vpn. Hypnotisierbarkeitsskalen, die Suggestionen enthielten, deren Ziel die linke oder rechte Seite des Körpers war. Es traten keine konsistenten Unterschiede in der Reaktionsstärke auf der linken im Vergleich zu der rechten Seite auf. Noch bestanden Unterschiede in Hypnotisierbarkeit zwischen rechts- und links-händigen (oder gleichhändigen) Vpn. oder zwischen Vpn., die auf der linken im Gegensatz zur rechten Seite des Prüfungsraumes saßen. Ein entscheidender Beweis für die mit Hypnose und Hypnotisierbarkeit verbundene Gehirnseitenaktivität kann nur von direkten neuropsychologischen, elektrokortikalen oder gehirnverbildlichten Untersuchungen kommen.

La latéralité des réponses hypnotiques

Laura L. Otto-Salaj, Robert Nadon, Irene P. Hoyt, Patricia A. Register,
et John F. Kihlstrom

Résumé: Dans une étude portant sur l'activité-hémisphérique durant l'hypnose, 1269 Ss au total, ont été soumis à des échelles d'hypnotisabilité contenant des suggestions impli-

quant le côté droit ou gauche du corps. Aucune différence systématique entre la force de réponse du côté droit et du côté gauche n'a été trouvée. Aucune différence d'hypnotisabilité n'a également été trouvée entre les droitiers, les gauchers et les ambidextres, ni entre les Ss qui se sont assis dans la section droite et la section gauche du laboratoire d'examen. Des preuves d'association entre l'activité cérébrale latéralisée et l'hypnotisabilité ne peuvent venir que des investigations neuropsychologiques, électrocorticales ou d'imagerie cérébrale.

Lateralidad de la respuesta hipnotica

Laura L. Otto-Salaj, Robert Nadon, Irene P. Hoyt, Patricia A. Register
y John F. Kihlstrom

Resumen: Se realizó una investigación de la actividad hemisférica durante el tiempo de la hipnosis; a tal efecto a un total de 1,269 sujetos se les administraron escalas de sugestibilidad hipnótica que contenían sugerencias que marcaban el lado izquierdo o derecho del cuerpo. No se encontraron diferencias consistentes en la fuerza de la respuesta al comparar el lado izquierdo con el lado derecho. Tampoco existieron diferencias en la hipnotizabilidad entre los sujetos diestros y los siniestros (y los ambidiestros), o entre los sujetos que se sentaron en el extremo derecho o izquierdo de la sala donde fueron testados. Una evidencia definitiva de la actividad cerebral lateralizada asociada a la hipnosis y a la sugestibilidad, solamente podrá lograrse mediante investigaciones directamente neuropsicológicas, electrocorticales o estudios cerebrales por imágenes.