

ARTIFACT IN SOCIAL PSYCHOLOGICAL RESEARCH: THE SUBJECT'S VIEW

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A questionnaire was developed to test how subjects in psychological research conceptualize the experimental task and was administered to students differing in their knowledge and experience of psychological experiments. The nature of the factors suggested that subjects conceptualized psychological experiments in terms of: (a) apprehension about how their personality will be evaluated; (b) a general desire to help the experimenter; (c) a desire to learn hypotheses and to act in accordance with them and (d) a complex of interrelated factors concerned with following the experimenter's instructions, cooperating with him, performing to the best of their ability, and giving honest data—all of which seem to corroborate a "faithful subject role". Subjects also saw experiments in terms of deception and attitudes that are task specific or related to psychological research or science in the abstract.

An extensive body of literature has accumulated about the biasing effects of uncontrolled characteristics of subjects in behavioural research (e.g. Schultz, 1969; Rosenthal and Rosnow, 1969; Weber and Cook, 1972). Most of this work has been based on examining experimental data to see how well they fit orientations like: (a) suspiciousness or awareness of deception; (b) evaluation apprehension; (c) various subject roles, especially the so-called "good", "negativistic", and "faithful" roles; (d) volunteering, or the subject's tendency to be a volunteer; and (e) general attitudes about psychology, psychological research, science, and the scientific method. We do not know, however, whether the orientations mentioned above are inventions by experimenters or whether they actually reflect how subjects anticipate or react to their experimental tasks. To resolve this dilemma requires asking subjects about their motives, feelings, and behaviours in experiments, and the questionnaire method would seem most appropriate for this.

The questionnaire method can have several drawbacks when used for this purpose. If the items are all generated by experimenters there is the danger that some of the dimensions along which subjects' reactions differ may be missed. For this reason, the items used in this study were generated by naive and experienced subjects as well as experimenters. The use of "experienced" subjects, who nevertheless were not familiar with the literature on subject artifacts, also reduces the possibility of the resulting dimensions simply being inventions by experimenters. There is also the possibility that questionnaire responses may be biased by the very predispositions they are meant to uncover. For example, a "good" subject should report what he thinks the experimenter wants him to say about participating in research rather than

what he really believes. This probably explains why descriptive questionnaire and interview studies are rare in the literature on subject artifacts. But all questionnaire or interview methods are not equally flawed (Page, 1973). In this factor analytic study, it might be assumed that subjects do not have the sophistication to deliberately create or decompose "factors" which they think are related to what the experimenter wants to infer from his data. A major problem with factor analysis is that the resultant factors often reflect nothing more than what was put into them—this is not as great a problem for this study since items were generated by naive and experienced subjects as well as experimenters.

METHOD

Subjects

Items about participating in psychological research were initially generated by approximately 100 subjects whose knowledge of psychology and experience varied from completely naive introductory students to knowledgeable graduate students in psychology. The resulting item pool was refined and responses to the refined pool were collected from two independent samples of introductory psychology students who differed in the amount of their previous experience as research subjects and who were not involved in the generation of items. One sample consisted of 109 students 19 weeks through their 30 week introductory course. These students can be considered *Experienced* as subjects (but not knowledgeable about subject artifacts) and are labelled Sample E accordingly. The questionnaire was revised on the basis of testing Sample E before being administered to a second sample, which consisted of 148 students from the following years intake who were only four weeks into their introductory course. These students can be considered as *Inexperienced* and are labelled Sample I. Each sample was evenly divided by sex, and the median age of all subjects was 18.6 years.

Materials and procedure

A set of 120 statements reflecting various feelings and motivations that subjects in psychological research might experience were generated by asking a heterogeneous group of psychology students to write down any feelings, attitudes, desires, etc., about psychology, psychological research, science, the scientific method, and being a subject, that they might have experienced, or might expect to experience as a subject. This pool was reduced to 60 items by asking 24 research students and staff members to "judge" the statements for their logic and ambiguity and discarding those items judged to be illogical or ambiguous by five or more judges. The list of items was further modified for Sample I by removing 16 items with a communality less than 0.40 because some subjects in Sample E expressed the view that the scale was too long. Nine items were reversed in their wording to try to eliminate direction of wording artifacts, and 12 new items, generated by the authors from descriptive statements existing in the previous literature, were added in an attempt

to help clarify the factor structure still further. This resulted in 52 items being administered to Sample I. Thirty-one of the items remained constant across samples. Some of the items in Sample I involve hypothetical reactions (e.g. "I would . . ."), while the Sample E items deal with actual reactions (e.g., "I am . . ."): such differences, as well as differences between samples, could lead to different factors appearing with consequent differing interpretations.

The items were randomly ordered in the particular booklet that each sample received. Responses were recorded on a seven-point scale from totally agree (7) through to totally disagree (1). Subjects marked the position that best described their reaction to the item. Each questionnaire was completed at a scheduled two-hour laboratory class at which other questionnaires were also completed. Subjects were simply told that the various questionnaires and tests were required by staff and graduate students for research use, and each questionnaire was discussed in detail and results presented to them at a later date.

Analysis of the questionnaire data

Two analyses were carried out for each sample. One analysis was of the total set of items in each sample's questionnaire and the other was of the 31 items that were common to the questionnaires. In all cases the principal-factor solution, with iteration to improve the estimates of communality (initially estimated from R^2), was followed by oblique rotation (oblimin criterion.) The number of factors extracted was determined by the number of pre-rotation eigenvalues greater than one.²

Analysis of the 31 common items has the advantage of simplifying cross-sample comparisons and of permitting an assessment of the extent to which factors can be replicated across samples. Analysis of the different sets of items for each sample has the advantage that it permits an assessment of factor robustness by testing whether a particular factor that was found in the common items analysis is still found when additional items, which might be conceptually different from any in the common set, allow unique factors to form that could "split" factors from the common items analysis. For these reasons, the detailed results from the all-items analyses will be reported, while the detailed results from the common-items analyses will not be reported unless they are different from the all-items analyses results. Similarly, means on the items will not be reported unless they aid interpretation.

RESULTS AND DISCUSSION

The factors extracted accounted for between 65% and 75% of the common variance for the four analyses. The 31 common-items analysis of Sample I resulted in ten factors, one of which was not readily interpretable. The 31 common-items analysis of Sample E also resulted in ten factors, eight of which were the same as the factors derived from Sample I. The other two factors were uninterpretable. There was a noteworthy similarity between the factor structures derived from the two independent and different samples.

The all-items analysis of Sample I resulted in 16 factors, eight of which were direct replications of factors produced in the common-items analysis. Three factors from the 31 common items analysis broke into two factors each in the all-items analysis. The remaining two factors were new ones and one of these was uninterpretable. The all-items analysis of Sample E resulted in 19 factors, seven of which were direct replications of factors from the 31 common-items analysis. Two of the factors from the common-items analysis broke into two factors each. The remaining eight factors were new ones, two of which consisted of a single item and five of which were not interpretable.

Salient loadings (equal to or greater than $|.30|$ for at least one of the samples) of the items on the factors obtained are listed below. Items that were administered in both samples are listed first on each factor; in cases where the wording of these items varied slightly in the two administrations, the wording for Sample I is shown in parentheses.

Factor A

Item ^a	Loading Sample		Mean Sample	
	I	E	I	E
1 I am afraid of revealing my weaknesses to a researcher.	.72	.82	3.2	3.2
2 I am (would be) afraid of being ridiculed by a researcher.	.67	.60	2.8	3.0
3 Answering questionnaires makes me feel anxious.	.21	.40	3.1	2.9
4 I am afraid of revealing some inadequacy in a personality test.		.75		3.3
5 I am afraid of being evaluated or judged by an experimenter.	.62		3.1	
6 I like to behave in a way that will be approved of by everybody.	.41		3.7	
7 I am afraid that some of my values may be undermined by answering a questionnaire.		.32		2.5
8 I am not afraid of revealing my inadequacies in a personality test.	-.46		4.5	

Three items, all of which seem to be concerned with the personality or mental health aspect of *evaluation apprehension*, consistently loaded this factor in all four analyses. The other items, administered to only one of the samples, loading on this factor also seem to have the same content. Both sets of subjects report little apprehension of being evaluated.

As described by Riecken (1962) and Rosenberg (1965, 1969) the concept of evaluation apprehension includes a "performing well" or "putting one's best foot forward" aspect as well as a concern with others' assessment of one's psychological adjustment. There was only one item tapping apprehension about evaluation of one's performance ("I would never worry about how I did on any psychological task that an experimenter might give me").

Further research may support the trends here that performance and personality aspects of evaluation apprehension may be related.

Factor B

	Loading Sample		Mean Sample	
	I	E	I	E
9 As a subject in psychological research I (would) like to try and figure out what the experiment is all about so that I can (could) help the experimenter.	.57	.61	4.1	3.8
10 I (would) have a strong desire to always please the experimenter if I am (was) a subject in psychological research.	.50	.39	2.7	3.4
11 I (would) like my performance on a questionnaire to contribute towards proving a hypothesis.	.40	.21	4.6	4.4
12 I (would) never try to please a research worker in psychology.	-.43	-.71	4.1	3.7
13 I would try to give an experimenter data that would support his hypothesis.	.73		2.9	
14 I have a strong desire to perform my very best in psychological experiments.		.37		4.2
15 I would try to give an experimenter data that would directly oppose his hypothesis.	.32		2.6	

Factor B was consistently loaded by three items in all four analyses concerned with *pleasing or helping the experimenter*. Other items had a similar content. Scores on this factor are near neutral for both samples. The addition of the extra items for Sample I led to a "hypothesis" factor (Factor C) being formed for each sample that included one of the items from Factor B.

Factor C

	Sample Loading		Sample Mean	
	I	E	I	E
11 I (would) like my performance on a questionnaire to contribute towards proving a hypothesis.		.46	4.6	4.4
9 As a subject in psychological research I (would) like to try and figure out what the experiment is all about so that I can (could) help the experimenter.	.29		4.1	3.8
16 I would like my performance in a psychological experiment to contribute towards proving the experimenter's hypothesis true.		.77		3.6
17 As a subject in a psychological experiment I would attempt to guess the purpose and the hypothesis of the experiment.	.68		4.9	
18 I would try not to let knowledge of an experimenter's hypothesis affect how I behave in his experiment.	.35		5.5	

For Sample I Factor C was composed of items which dealt with wishing to *learn* the experimenter's hypothesis, though the sign of one of them (item 18) indicates that subjects would not want knowledge of the hypothesis to affect their behaviour. The "*hypothesis*" factor in Sample E is slightly different, being concerned with *performing* in accordance with *a* hypothesis or *the experimenter's* hypothesis.

An important theoretical issue is whether or not subjects understand their willingness to help or hinder the experimenter in terms of corroborating or disconfirming what they take to be his hypothesis. The evidence is not conclusive on this point. On the one hand, item 11 falls into Factor B (the "helping" factor) and has to do with proving a hypothesis; and the two additional Sample I items that load this factor (items 17 and 18) mention the experimenter's hypothesis. On the other hand, item 13 does not explicitly mention the experimenter's hypothesis; items 13 and 15 are *positively* related to each other yet are reverse wordings of the same item; and a further item (22: "I would like my performance in a psychological experiment to disprove the experimenter's hypothesis") does not load on Factor B, though it explicitly refers to disproving the experimenter's hypothesis. In addition, the helping and hypothesis factors were not correlated for Sample I ($r = .01$), though they were marginally related for Sample E ($r = .18, p < .10$).⁴

The mean ratings of the items in Factors B and C help shed some interpretative light on the theoretical issue of subjects' willingness to help by corroborating the experimenter's hypothesis. The mean for item 13 was 2.9, indicating that subjects did not agree that they would try to support his hypothesis; the mean for item 15 was 2.6, indicating that they did not agree that they would try to oppose his hypothesis; the mean for item 16 was just below the midpoint, indicating that they did not particularly want their performance to corroborate his hypothesis, and the mean for item 22 was 3.1, suggesting that subjects did not want their performance to disconfirm his hypothesis. In short, the trend is consistent and subjects report disagreement with items that ask if they want to corroborate *or* disconfirm hypotheses. (This conclusion is also implied by Factor C in Sample I, for subjects conceive of learning the experimenter's hypothesis *and their behaviour not being affected by it* in the same factor.)

If we can take these reports at their face value they indicate that: (a) subjects conceptualize experiments in terms of hypothesis-learning; but (b) they may not want to help by corroborating or disconfirming the experimenter's hypothesis. However, such a conclusion can only be made about Sample I, particularly since few of the items about corroborating with the experimenter's hypothesis were put to the experienced subjects.

The helping factor was also correlated with the evaluation apprehension factor ($r = .22, p < .05$ for Sample I and $r = .18, p < .10$ for Sample E), possibly indicating that helping the experimenter might be weakly related to being evaluated as healthy.

Factor D	Loading Sample			Mean Sample	
	I ₁	I ₂	E	I ₁	E
19 In a psychological experiment the experimenter's instructions should always be followed to the letter.	.28		.76	5.6	4.6
20 I (would) like to follow instructions properly so as not to ruin a researcher's work.	.43	.38	.58	5.9	5.3
21 I (would) always perform any task in a psychological experiment to the best of my ability.	.35			5.7	5.2
		Loading Sample		Mean Sample	
		I	E	I	E
22 I would like my performance in a psychological experiment to disprove the experimenter's hypothesis.			-.83	3.1	
23 If I was asked to take part in a psychological experiment I would fully expect to be deceived.			-.33	2.9	
5 I am afraid of being evaluated or judged by an experimenter.			-.39	3.1	
24 In a psychological experiment I would try to be as uncooperative as possible.			-.46	1.8	
25 I would prefer to hinder rather than help a researcher.			-.58	2.0	

Factor D is robust, appearing in all four analyses. The two items that are common to four analyses deal with *following the experimenter's instructions*. The additional item loading on Sample I, however, deals with disproving the experimenter's hypothesis. This indicates that the factor is probably concerned with a bipolar dimension which includes the *negativistic subject role* or the "screw you" effect at one extreme, and following instructions or some sort of *faithful subject* role at the other.

The existence of a second factor for Sample I suggests that being unco-operative might be conceptualised as being different from being absolutely negativistic or the "screw you" effect. These two factors for Sample I were correlated .25 ($p < .01$), and neither factor correlated with any of Factors A to C. The mean scores indicate that most subjects want to be faithful rather than negativistic—but inexperienced subjects are more faithful than experienced subjects.

Factor E	Loading		Loading		Mean		
	All Items Sample E	Common Items Sample I	Common Items Sample E	I	E	Sample I	Sample E
26 I (would) try to the best of my ability to do what is asked of me in an experiment.	.75	.58	.53	6.0	5.5		
27 I (would) always perform any task in a psychological experiment to the best of my ability.	.68	.31	.67	5.2	5.2		

	Loading All Items analyses Sample E	Mean Sample	
		I	E
14 I have a strong desire to perform my very best in psychological experiments.	.47		4.2
28 I prefer to help rather than hinder a researcher.	.54		5.3
29 In a psychological experiment I try to co-operate with the researcher as much as possible.	.64		5.4

The two items common to Factor E in three of the four analyses deal with *subjects performing to the best of their ability*, as does one of the three items unique to Sample E which loads on the factor. The other two items loading from Sample E concern being co-operative—they are, in fact, reversals of the unco-operativeness items in Factor D for Sample I₂. It seems then, that subjects may understand performing to the best of their ability in terms of co-operating with the experimenter. It may also be that the relationship between being co-operative and performing well in experiments is stronger than the relationship between being unco-operative and performing badly. This is only a speculation at this time, since it is based solely on the fact that the unco-operativeness items do not load on Factor E.

Factor F

	Loading	Mean
	Sample I	Sample I
26 I (would) try to the best of my ability to do what is asked of me in an experiment.	.39	6.0
30 I (would) never volunteer to take part in a psychological experiment.	-.32	2.4
31 My responses to these statements are completely representative of my true views and feelings.	.69	5.8
32 I would try to behave my natural self, no matter what the situation.	.43	5.8
33 I have been completely willing to co-operate for this project.	.38	6.0

Only the all items analysis of Sample I produced Factor F, which contained one item from Factor E (item 26.) Factor F is a mixed factor, but the highest loadings have to do with being one's natural self and giving honest data as well as being co-operative. The *faithful subject role* is again suggested. Factor F correlated with D ($r = .15, p < .10$ for I₁, and $r = .30, p < .001$ for I₂).

The correlations between Factors D, and F and some items overlapping these factors and Factor E, indicate that these three factors are empirically related, as they also seem to be by face validity criteria.

They can all be construed as being relevant to the *faithful subject role* in as far as they deal with following instructions, being co-operative, and giving honest data. Moreover, it is a defining attribute of the role that subjects do not seek out, or seek to corroborate, hypotheses, and it is noteworthy that most hypothesis-relevant items do not load on these factors. Two of these factors could also be construed as being relevant to the negativistic subject role in that they deal with disproving the experimenter's hypothesis and being unco-operative (Factor D). These results suggest that the dimensions involved with the faithful, the good and the negativistic subject roles may be more complex than has so far been discussed in the literature. There is, however, insufficient evidence in this data from which to draw firm conclusions.

Factor H	Loading		Mean	
	Sample		Sample	
	I	E	I	E
34 I don't think that experimenters ever deceive their subjects.	.72	.72	3.0	2.5
35 Experimenters do not deliberately deceive their subjects.	.72	.66	3.7	3.0
36 Researchers in psychology generally misinform their subjects.	-.14	-.41	3.1	3.8
37 If I was asked to take part in a psychological experiment I would fully expect to be deceived.	-.29	-.43	2.9	3.4

Factor G was robust, appearing in all four analyses, with all the items dealing with *deception* in experiments. The mean ratings on the items making up Factor G indicate that subjects are aware of deception, and that this awareness may grow with experience as a subject (Sample E means indicate greater awareness of deception than Sample I means). But the available data give no indication that subjects relate their concern with deception to their concern with experimental performance.

Factor G	Loading		Mean	
	Sample		Sample	
	I	E	I	E
38 I am enjoying answering this questionnaire.	.74	.35	4.4	4.8
39 I (would) welcome the opportunity that psychological experiments (would) give me to learn something about myself.	.35		5.7	4.8
40 It is irritating having to rate all these statements.	-.36	-.49	4.3	5.0
41 Answering this questionnaire gives me an opportunity to serve science.		.61		4.0
33 I have been completely willing to co-operate for this project.	.57		6.0	
42 Researchers in psychology always have some good or legitimate reason for whatever they do and whatever demands they make on a subject.	.34		4.4	
43 My time is too valuable to take part in psychological experiments.		-.33		3.0
7 I am afraid that some of my values may be undermined by answering a questionnaire.		-.41		2.5

The two items common to all four analyses as well as most other items loading on Factor H have to do with *feelings about completing the questionnaire* from which the present analyses were derived. Thus, the factor might be labeled as a *task specific attitude factor*. It seems to be of little relevance to past theoretical discussions of subject behaviour.

Factor I

	Loading All Items analyses Sample			Loading Common Items analyses Sample		Mean Sample	
	I	E ₁	E ₂	I	E	I	E
44 Scientific method should be taught in all schools.	.34		.31	.72	.64	4.5	4.8
45 Science is dehumanising.	-.12	-.37	-.69	.10	-.35	3.5	3.4
46 Scientific method is too exact for psychology.	-.62		-.12	-.26	-.63	3.3	3.5
10 I have a strong desire to always please an experimenter.		.35				2.7	
47 Generally, my attitudes towards science and the scientific method are very favourable.	.62					4.7	
48 Science enables man to separate the true from the false, right from wrong, reality from fantasy.			.31				4.5
49 Scientific method lacks imagination.			-.64				3.5
50 Scientific method forgets that people have feelings.			-.74				3.7
51 Scientific method takes account of people's feelings.		.51				3.1	

Factor I obviously deals with attitudes about *science and the scientific method*. Most noteworthy is that subjects seem to differentiate between the methodological and the humanitarian aspects of science and the scientific method. It is not clear how attitudes about science relate to subject roles.

Factor J

	Loading All Items analyses Sample			Loading Common Items analyses Sample		Mean Sample	
	I	E ₁	E ₂	I	E	I	E
52 I (would) like volunteering to take part in psychological research.		.60	.31		.77	5.1	4.1
30 I (would) never volunteer to take part in a psychological experiment.	-.40	-.53	-.58	-.43	-.84	2.4	2.8

43 My time is too valuable to take part in psychological experiments.	-.87	-.30	-.92	-.30	2.6	3.0
53 Psychological research is a complete waste of time and money.	-.82		-.75		3.0	1.9
54 I only take part in those psychological experiments that count towards my University credits.	-.31					2.4
55 I fear that information that I reveal to an experimenter will not be confidential.			-.55			3.3
56 Psychological researchers have too much control over their subjects.			-.40			3.5

There are four items common to both samples which recur in Factor J. Two are concerned with *volunteering*, and two with the *value of psychological research*. For Sample I the two value items load most highly, together with one of the volunteering items, while for Sample E the volunteering items load together and are joined by one of the value items in the all items analysis and in one of the two factors involved in the common items analysis. Of the two factors involved, the first listed is concerned only with volunteering but the second relates trust in experimenters to volunteering. The following factor (K) is conceptually related to the volunteering factors, although not statistically correlated.

Factor K

	Loading All Items analyses		Loading Common Items analyses		Mean Sample	
	I	E	I	I	E	E
	57 Psychological research helps man realise himself by gaining understanding of himself and others around him.	.33	.62	.67	3.7	5.5
39 I (would) welcome the opportunity that psychological experiments (would) give me to learn something about myself.			.51	3.1	4.8	
58 The study of human behaviour is important in advancing society to higher levels.	.56	.35	.26	5.0	5.2	
59 Psychological research accomplishes nothing worthwhile, either for the individual or for society.	-.32	-.69		1.9	1.8	
53 Psychological research is a complete waste of time and money.				2.0	1.9	

60 If I wasn't given much information I would try and guess the purpose of an experiment.	.33	5.1
56 Psychological researchers have too much control over their subjects.	-.34	3.5

Each sample in the all items analyses produced Factor K, which is a purer factor related to the *value of psychological research*. The lack of correlation between factors J and K suggests that volunteers do not necessarily value psychological research any more than non-volunteers. Mean scores indicate that inexperienced subjects are more likely to volunteer than experienced subjects. Subjects who value psychological research and who volunteer are also likely to be the ones who adopt the faithful subject role.

CONCLUSIONS

We interpret the totality of the present data as indicating that subjects with different amounts of sophistication about psychology and psychological research react to experimental situations in terms of constructs that resemble the mental health aspect of evaluation apprehension (Rosenberg, 1969) and in terms of constructs like those attributed to the various subject roles. But while there is evidence from each sample that subjects want to help the experimenter and are mindful of hypotheses, the data do not consistently indicate that subjects want to act in accordance with hypotheses. There is, therefore, conflicting support for the theoretically derived constructs of "the good subject" or "the negativistic subject" roles, which require that there be constructs related to a consistent orientation to confirm or disconfirm an experimenter's hypothesis.

We suggest that future research be aimed at: (a) improvement of a scale made up of items from this research, or ones like them, with which to classify and discriminate subjects according to their orientations to the experimental situation; (b) assessment of the validity of the various factors isolated here by relating them to experimental results; (c) manipulation of experimental conditions in order to vary subject reaction to the situation, rather than viewing the constructs simply as individual orientations; and (d) investigation of the comparative roles in experimental situations of individual orientations and situational determinants of behaviour, and their consequent contribution to results from experimental social psychological research.

Footnotes

1. Requests for reprints should be sent to Dr P. N. Hamid, Psychology Department, University of Waikato, Hamilton, New Zealand.
2. Analysis was done on a CDC 6600 computer, making use of the SPSS statistics package (Nie, Bent and Hull, 1970). The analysis described results when the TYPE PA2 option is used with OBLIQUE ROTATION.
3. Items are numbered in order of their appearance in this report, merely for ease of reporting, rather than in the order in which they were administered.
4. All reported correlations between factors are directly obtained from the factor pattern correlations matrices.

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