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SOME IMPLICIT PRESUPPOSITIONS INVOLVED IN
THE DISAGREEMENT OVER THE DNA GUIDELINES

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ABSTRACT

This paper is one of a series reporting studies we have made of differences in implicit presuppositions and of how such differences affect the ways people reason. In the study reported here 26 students (14 at Caltech; 12 at Claremont) read and rated four letters which had appeared in the correspondence columns of Science. Two of the letters defended the guidelines governing DNA research; two criticized them. The students rated the letters on six scales, or "dimensions," each of which represents a contrasting pair of implicit presuppositions, which we have identified and defined. For two of the six dimensions all four of the letters were rated in the predicted direction, and all are statistically significant. On a third dimension all four of the letters were rated in the predicted direction, but only three of the four are statistically significant. For the other three dimensions there was no consistent pattern, though some of the results on some of the dimensions were in the predicted direction and are statistically significant. Thus this study shows that in certain important respects the presuppositions of the proponents and the presupposition of the opponents of the guidelines are not only different but diametrically opposed.

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The study reported here is one of a series we are making of implicit presuppositions and of their effects on the ways in which scientists (and laymen, too, of course) reason. Differences in implicit presuppositions may explain why they sometimes reach different conclusions from the same body of evidence (Jones, 1970, 1972, 1973, 1976, 1980).

What are implicit presuppositions and how do they affect the reasoning of scientists? An implicit presupposition may be thought of as the unstated, and often unformulated, major premise of an argument. Some scientists, for instance, take it for granted (i.e., implicitly presuppose) that exact solutions of complex problems are possible, even though admittedly difficult to achieve in particular cases. Others take it for granted (presuppose) that exact solutions are impossible or undesirable or both. If scientists discussing the DNA

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guidelines for the regulation of federally funded research happen to differ in such a fundamental respect over the possibility of exact solutions, it would not be surprising if they were also to differ over the adequacy of those guidelines, and over whether the advancement of research or the reduction of hazard should have the higher priority.

METHOD

In the present study we used four letters which had appeared in the correspondence columns of Science, and we tested these letters for some of the implicit presuppositions they contained.¹ The four letters were selected from a series written in response to a letter by Erwin Chargaff attacking the Federal guidelines for research on DNA. Two anti-guidelines letters — Chargaff's own letter and a letter by Francine Robinson Simring which supported Chargaff's position — and two pro-guidelines letters — one by Bernard D. Davis and a joint letter by Maxine F. Singer and Paul Berg — were analyzed. All four letters were read by 26 students, 14 at Caltech and 12 at the Claremont Colleges. They then rated the letters for the presence or absence of six contrasting pairs of implicit presuppositions, using rating sheets with which we provided them. (See Table 1 for the definitions of the pairs of presuppositions used in this test and Figure 1 for a sample rating sheet.)

[Table 1 about here]

RESULTS

We predicted that the anti-guideline letters and the pro-guideline letters would be polarized on these six dimensions. Specifically, we predicted that the anti-letters would be rated as emphasizing wholes more than independent elements (D-3); the dynamic, more than the static (D-4); generalities, more than particularities (D-6); the attitude of a participant, more than of an observer (D-7); perception of the world as complex, rather than simple (D-10); and belief that the world is at best only partially intelligible, rather than fundamentally intelligible (D-11). (The alphanumeric designations refer to the numbers in our complete set of eleven dimensions which are listed in Working Paper 357. They are used here to help identify the dimensions across studies.) By contrast, the pro-letters were predicted to be rated as emphasizing the opposite poles.

The four letters were each rated on six dimensions, thus generating 24 comparisons between the number of ratings toward one pole of a dimension, i.e., ratings A through E, and the number of ratings toward the other pole, i.e., ratings V through Z.

[Table 2 about here]

Of these 24 comparisons, 19 show a split in which the preponderance of ratings are consistent with our predictions, and 15 of these are significant, when compared against a chance 50/50 split, the expected value if the ratings of a particular letter were random. The other five comparisons were not contrary to our predictions but were equal

splits. From the significant polarization of ratings on D-3 and D-11, the strong directionality of ratings on D-10 and the general consistency of the ratings with our predictions, we could infer that these results support our hypotheses.

However, inasmuch as our hypotheses proposed that pro-letters would be different from anti-letters (that is, that the pro- and anti-letters would be polarized on each dimension), and we predicted the direction of that polarization, a more direct statistical test of these hypotheses can be made. We can ask how many of the raters rated each of the pro-letters more in the predicted direction than they rated either of the anti-letters. This direct test of our hypothesis is a more powerful approach since it can find the significant differences between two separate splits when neither splits is significant in itself, and it uses rank-order data, e.g., the relative positions of the letter rating values.

[Table 3 about here]

The above analyses show that raters were, to a significant extent, in agreement about implicit presuppositions made in the four letters. When we analyzed the letters by pairs we found that the raters perceived the presuppositions of the pro-letters to be different from those of the anti-letters on all dimensions but D-4. This analysis does not, however, yield any information about the extent of the perceived differences. We therefore computed the medians and the first and third quartiles for each of the four letters on each of the three dimensions for which the ratings of individual

letters showed significant consensus toward one pole or the other (see Table 2). These values are presented in Table 4.

[Table 4 about here]

Table 4 shows that the medians for the two pro-letters are close together, as are those for the two anti-letters. Three of the pro-medians are identical; five of the anti-medians are identical. Moreover the pro-letters and the anti-letters are so strongly bipolarized that there is no overlap between the respective interquartile ranges.

DISCUSSION

The findings shown in Tables 2, 3, and 4 are integrated in Table 5, where, for convenience, the findings are stated in shorthand versions of the definitions of each dimension.

[Table 5 about here]

First, as regards to D-3: the ratings of individual letters (Table 2) indicate that the two pro-letters presuppose an emphasis on individual parts or elements (median ratings of C and D; see Table 4). The two anti-letters presuppose an emphasis on the whole (median ratings of Y). Moreover, as would be expected from the very strong polarization of the ratings on D-3, the comparison of pairs of pro- and anti-letters (Table 3) shows that this polarization characterizes each of the four possible pairings.

On D-10, the ratings of individual letters (Table 2) show that both anti-letters presuppose the world to be fundamentally complex (median values are both Y) and that both pro-letters presuppose the world to be fundamentally simple (median values are both C). The comparison of pairs of pro- and anti-letters (Table 3) shows that all possible pairs reflect this pattern.

On D-11, all ratings of individual letters (Table 2) were in the predicted direction and significant. Median values (Table 4) for the pro-letters are B and A; median values for the anti-letters are X and Y. Pair-wise comparisons (Table 3) confirm these results: each of the pro-letters (Davis and Singer-Berg) is rated as presupposing an intelligible world when it is compared with each of the anti-letters (Chargaff and Simring).

Next as regards D-6: we had predicted that the pro-letters would presuppose a greater emphasis on particularity than would the anti-letters. The ratings of all individual letters (see Table 2) are consistent with our predictions. Moreover, when pairs of anti- vs. pro-letters are analyzed (Table 3) all of the pair comparisons are significantly in the predicted direction: each of the anti-letters is rated as emphasizing generalities more than either of the pro-letters.

On D-7 the ratings of individual letters (Table 2) resulted in significant consensus only for the Chargaff letter, which was rated, as we had predicted the anti-letters would be rated, as presupposing the point of view of a participant. In the pair-wise comparisons (Table 3) the Davis, pro-guidelines letter, is rated as taking the observer stance, as compared with both the anti-guidelines letters of

Chargaff and Simring. The Singer-Berg letter is in the predicted direction as compared with both anti-guidelines letters but the results are not significant.

What can be inferred from these ratings? We believe it possible that the different implicit presuppositions that show up on these dimensions help explain differential attitudes toward risk-taking. The writers of the pro-letters do not deny that some risks are involved in adopting the guidelines but they regard these risks as acceptable, whereas the writers of the anti-letters view them as unacceptable. Now a belief that the world is simple and intelligible is likely to dispose one to believe that a reasonably reliable calculation of risks is feasible; one can know where one stands and so take appropriate measures as needed. In contrast, a belief that the world is complex and unintelligible is likely to make one skeptical of all cost/benefit computations; it therefore seems wise to play safe and not expose oneself to risks which are, quite literally, incalculable.

Again, to perceive the world as strongly segmented predisposes one to be less risk-averse than if one perceives everything as interrelated with everything else, for in a strongly segmented world, risks can be limited, confined, as it were, within one segment at a time. In contrast, the presupposition that the world is not strongly segmented but that the parts are closely interconnected within the whole, has an opposite effect — the experiments being done with E. coli cannot be contained and therefore are likely to have effects far beyond themselves.

Differences on D-6 also seem related to differential attitudes toward risk-taking. The writers of the anti-letters show a greater readiness to make generalizations covering a large number of phenomena, whereas, relatively, the pro-letters insist that each case must be considered on its own merits. We believe that if one perceives a risk as an isolated particular one is more likely to regard it as acceptable than if one generalizes it across many instances. Thus, we think it possible that our analysis has uncovered a complex of beliefs and attitudes that makes the opponents of the guidelines more risk-averse than the proponents (at least on this issue!)

We had predicted (D-7) that the pro-letters would presuppose an observer stance — the characteristically neutral, uncommitted stance associated with the sciences, whereas the anti-letters would reflect involvement in the issue and commitment to a "cause." Except for the Singer-Berg letter this pattern is found in the letters.

As regards D-4 the random results are puzzling. We had predicted that a disposition to believe that stable equilibria are the norm and that disrupted systems therefore tend to return to their original states, would cause one to perceive risks as relatively small, whereas a disposition to believe that unstable equilibria are the norm would cause one to perceive risks as relatively larger, since one cannot foresee the condition in which a disrupted system may end up. The ratings are consistent with our prediction only in the case of the Simring letter; the ratings for the other three letters are completely random. But here there was an interesting difference

between the ratings of the Caltech students, all of whom are scientists, and the Claremont students. A majority of the Caltech students rated the letters in accordance with our hypotheses — the two pro-letters as "static" and the two anti-letters as "dynamic." These results barely missed significance but the number of raters is small. The Claremonters reversed these ratings and barely missed significance in the reverse direction, with the consequence that when the ratings of the two groups are combined the results are random, as shown in Table 2. This is the only case in which there was any significant divergence between the Claremont students and the Caltech students, and at this time we are unable to account for it.

CONCLUSIONS

We believe that the results obtained in this study show that subjects who are guided by our definitions can agree about the differing implicit presuppositions underlying (but not stated explicitly in) the arguments by which people reach different conclusions from the "same" evidence. Second, we believe that this study shows at least some of the implicit presuppositions made in letters that are representative of the arguments pro and con on the DNA guidelines issue. Specifically, it shows that in important respects the presuppositions of the proponents and the presuppositions of the opponents are not only different but diametrically opposed.

This, we think, is not an unimportant finding. But we believe that this study points beyond itself to a more far-reaching possibility. It is a fact that disagreements on policy issues of all

kinds — on busing, on pollution, on abortion, on nuclear energy — tend to be nonterminating. Of course, such disagreements may end — either by court action, by majority vote, or by executive fiat. But the parties to the disagreements are seldom reconciled. The disagreements are not resolved; they only go underground to resurface later in other specific issues. If that is indeed the case, the explanation may be that patterns of implicit presuppositions, such as those we have uncovered in the analysis of these four letters, persist from one specific issue to another. This hypothesis seems to us to be both important and amenable to test.

FOOTNOTES

1. We are grateful to Margaret Mathies of the Joint Sciences Faculty at Claremont for making available to us the extensive file she has collected on the DNA controversy; we, however, are responsible for selecting the particular items used in this study and for the interpretation of them.

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FIGURE 1
A SAMPLE RATING SHEET

D-3

Ratings at positions toward this end represent increasingly greater degrees of this characteristic:

Emphasis on parts or elements of a whole, rather than on the whole itself. These parts are (or may be considered) independent of other parts. Parts themselves may be analyzed into constituent parts.

A _____
 B _____
 C _____
 D _____
 E _____

 V _____
 W _____
 X _____
 Y _____
 Z _____

Emphasis on the whole, rather than on parts. The parts themselves may not be clearly distinguished; if they are, relations among them are emphasized, not their independence.

Ratings at positions toward this end represent increasingly greater degrees of this characteristic.

TABLE 1
DEFINITIONS OF THE DIMENSIONS OF IMPLICIT
PRESUPPOSITION USED IN THIS STUDY

DIMENSION 3*

- one end - Emphasis on parts or elements of a whole, rather than on the whole itself. These parts are (or may be considered) independent of other parts. Parts themselves may be analyzed into constituent parts.
- other end - Emphasis on the whole, rather than on parts. The parts themselves may not be clearly distinguished; if they are, relations among them are emphasized, not their independence.

DIMENSION 4

- one end - Emphasis on states of rest or of stable equilibrium.
- other end - Emphasis on change, motion or transitional states.

DIMENSION 6

- one end - Emphasis on the general, rather than on the particular; on what holds true for many individuals or for many cases; on what is not tied down to a particular person, place or date.
- other end - Emphasis on what is specific or particular; on the unique characteristics of some person, place or date.

DIMENSION 7

- one end - Emphasis on the point of view of an observer, of one who is uninvolved in, detached from, the subject matter.
- other end - Emphasis on the point of view of a participant, of one who feels involved in or concerned (positively or negatively) with the subject matter.

DIMENSION 10

- one end - Emphasis on the position that the world seems fundamentally simple.
- other end - Emphasis on the position that the world seems fundamentally complex.

*The numbers assigned to dimensions identify them in our full list of eleven. Only six were used in this study.

DIMENSION 11

one end - Emphasis on the position that the world seems intelligible.

other end - Emphasis on the position that the world seems only partially intelligible or perhaps unintelligible.

TABLE 2

FREQUENCY DISTRIBUTION OF RATINGS FOR EACH LETTER ON THE SIX DIMENSIONS

	D-3		D-4		D-6		D-7		D-10		D-11	
	Elements	Whole	Static	Dynamic	General	Particular	Observer	Participant	Simple	Complex	Intelligible	Partially Intelligible
<u>Pro-letters</u>												
Davis	<u>23</u>	<u>1</u>	12	12	10	15	16	9	<u>19</u>	<u>6</u>	<u>24</u>	<u>1</u>
Singer-Berg	<u>19</u>	<u>5</u>	12	12	8	17	13	12	16	8	<u>23</u>	<u>1</u>
<u>Anti-letters</u>												
Chargaff	<u>3</u>	<u>20</u>	12	12	<u>24</u>	<u>2</u>	<u>2</u>	<u>24</u>	<u>3</u>	<u>22</u>	4	<u>20</u>
Simring	4	<u>21</u>	7	<u>18</u>	<u>19</u>	<u>6</u>	13	13	<u>2</u>	<u>22</u>	5	<u>19</u>

For each dimension the left hand column includes ratings from A to E and the right hand column includes ratings from V to Z. (Also see Figure 1 and Table 1.)

Underlining of numbers (e.g., 23) indicates that this split is significant at $p < .05$ one tail by sign test (Marascuilo, 1971, p. 97).

For some comparisons the data are incomplete since some subjects left some letters unrated on some scales.

TABLE 3
FREQUENCY DISTRIBUTIONS FOR COMPARISONS OF PRO- AND ANTI-LETTERS ON THE SIX DIMENSIONS

			D-3		D-4			D-6			D-7			D-10			D-11					
			Pro-letter emphasizes elements		Pro-letter emphasizes static view			Pro-letter emphasizes on generalities			Pro-letter emphasizes observer view			Pro-letter emphasizes world relatively simple			Pro-letter emphasizes world complex			Pro-letter emphasizes world partially intelligible		
Pro-letters	vs	Anti-letters	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n				
Davis	vs	Chargaff	<u>23</u>	1	1	13	1	10	5	-	<u>21</u>	<u>18</u>	3	5	<u>22</u>	0	3	<u>23</u>	2	1		
Davis	vs	Simring	<u>23</u>	-	1	13	-	10	3	2	<u>20</u>	<u>18</u>	2	5	<u>22</u>	1	2	<u>22</u>	1	2		
Singer-Berg	vs	Chargaff	<u>23</u>	2	0	14	2	8	6	3	<u>17</u>	13	5	8	<u>23</u>	0	2	<u>24</u>	1	1		
Singer-Berg	vs	Simring	<u>17</u>	3	4	14	1	9	5	2	<u>18</u>	11	5	9	<u>21</u>	1	3	<u>22</u>	2	1		

The number in each cell corresponds to the number of subjects who rated the pro-letter of a particular pair as characterized by a given presupposition, as contrasted with the anti-letter of that pair.

Underlining of numbers (e.g., 24) indicates that this split is significant at $p < .05$ one tail by the sign test (Marascuilo, 1971, p. 97).

For some comparisons data are incomplete since some subjects failed to rate some letters on some scales.

TABLE 4
MEDIAN AND FIRST AND THIRD QUANTILES FOR SIGNIFICANT DIMENSIONS

	D-3	D-10	D-11
<u>Pro-letters</u>			
Davis			
median	C	C	B
1st and 3rd quartiles	B C	B V	A C
Singer-Berg			
median	D	C	A
1st and 3rd quartiles	B E	B V	A C
<u>Anti-letters</u>			
Chargaff			
median	Y	Y	Y
1st and 3rd quartiles	W Z	W Z	X Y
Simring			
median	Y	Y	X
1st and 3rd quartiles	V Y	W Z	E Z

The alphabetical values correspond with the letters on the scales on which the subjects made their ratings. See Figure 1.

TABLE 5
RESULTS FOR PRO- AND ANTI-LETTERS INTEGRATED FROM TABLES 2, 3, AND 4

		D-3	D-6	D-7	D-10	D-11
Pro-letters	Davis	Emphasis on Independent Parts	Emphasis on Particularities	Emphasis on Posture of Observer	Perceives the World as Simple	Perceives the World as Intelligible
	Singer-Berg	Emphasis on Independent Parts	Emphasis on Particularities		Perceives the World as Simple	Perceives the World as Intelligible
Anti-letters	Chargaff	Emphasis on Wholes	Emphasis on Generalities	Emphasis on Posture of Participant	Perceives the World as Complex	Perceives the World as only Partially Intelligible
	Simring	Emphasis on Wholes	Emphasis on Generalities	Emphasis on Posture of Participant	Perceives the World as Complex	Perceives the World as only Partially Intelligible