COMPROMISE, LEARNING AND COGNITIVE CHANGE AS A
FUNCTION OF INDUCED COGNITIVE CONFLICT

by

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INTRODUCTION

In recent years social scientists have become increasingly concerned with questions of practical significance, such as warfare and race relations. One result of this general trend has been a sharp increase in research related to interpersonal conflict. Most of these studies deal with competitive conflicts, that is, conflicts that are primarily caused by two or more persons competing for the same goal, which only one can attain. In this type of conflict, one party can attain the desired goal only at the expense of the other party.

However, not all conflicts are necessarily competitive. Recent studies by Rappoport (1965) and Todd, Hammond and Wilkins (1965) demonstrate that interpersonal conflicts may arise when two or more persons who are working for a mutual goal have different ideas about how to achieve this goal. Rappoport (1965) suggests three conditions which make for the development of noncompetitive conflict: (1) mutual aims or goals; (2) uncertainty, and (3) discrepant cognitive processes. Uncertainty is required if different viewpoints or discrepant cognitive processes are to appear plausible.

In order to study this type of interpersonal situation in a controlled laboratory setting, and to stimulate further research, Hammond (1965) has developed a research paradigm for the study of cognitive conflict and its resolution.

Briefly, the research paradigm creates a situation in which two persons, who think differently about a problem, are brought together to work cooperatively on that problem. In the first stage of the paradigm, subjects receive training designed to produce cognitive differences. In the second stage these differences cause the subjects to disagree with one another when they must arrive at a joint decision. The paradigm is representative of various conflict situations, ranging from domestic problems to decisions on foreign policy.

The paradigm was developed in empirical studies by Hammond and his associates. These studies presented subjects with probabilistic cue material, according to which they must judge or estimate values on a covert distal variable. Cues are differentially weighted so that one cue might be highly correlated with the distal variable, while the others are only slightly correlated with the distal variable.

In previous research the problems used have varied. Rappoport (1965) used geometric figures, where three aspects of the figures served as cues and the distal variable was a number ranging from 1-9. An investigation by Todd, Hammond and Wilkins (1965) used the paradigm to study a hypothetical political problem. In this study the cues used were statements concerning: (a) the degree of free elections existing in the nation, and (b) the extent to which state control over an individual was a factor in the government. On the basis of these cues, the subjects were required to estimate the

"level of democratic institutions" in a given nation.

The results of these studies indicate that the three important dimensions of cognitive conflict are learning, conflict resolution, and cognitive change. It has been demonstrated that learning goes on in both stages of the paradigm. Subjects learn to rely on the high validity cue in the training stage and later in the second stage they learn to shift emphasis to another cue. Disagreements between subjects working together are resolved either through compromise or capitulation. In the former case, both subjects depart from their original private judgments and attempt to "split the difference." In the latter case, one subject simply agrees to the judgment of the other. Cognitive change may occur during the common task as subjects are either influenced by their partners and/or learn new cue values in the common task.

Prior research has been concerned with different independent variables and their influence on conflict resolution. Rappoport (1965) studied subjects' cognitive orientation toward the task. His results show that subjects given an intuitive set toward their task develop less conflict, and tend to resolve their conflict by compromise to a greater extent than subjects given an analytical set. Todd, Hammond, and Wilkins (1965) studied conflict resolution as a function of the type of feedback subjects receive; either unambiguous or ambiguous feedback. They report that there is a greater

tendency to compromise when subjects receive unambiguous
accuracy feedback.

In sum, these studies demonstrate that conflict can
be traced to cognitive differences and, that <u>learning</u>,
<u>compromise</u>, and <u>cognitive change</u> are the important dimen-
sions of cognitive conflict. Even as these dimensions have
emerged as crucial to the understanding of cognitive conflict,
they have thus far only been studied in experiments that also
treat conflict as a dependent variable. Learning, compromise,
and cognitive change have been identified as important dimen-
sions but they have not been studied systematically as a func-
tion of conflict. It is important to carry out such a syste-
matic study, because previous experiments have been based on
a narrow range of conflict, and individual differences among
subjects have not been investigated. The present study is
based upon quantitatively and qualitatively different types
of conflict. The major dimensions of cognitive conflict will
here be studied as a function of both the amount of disagree-
ment expressed and the manner in which it is expressed.

DESIGN AND PROCEDURES

Problem

The purpose of this study is to investigate the major
dimensions of cognitive conflict: learning, compromise, and
cognitive change; as a function of different levels and types

of disagreement. Previous studies have noted these important
dimensions of cognitive conflict, but in this study we spe-
cifically examine these dimensions to determine how they may
be related to different types and degrees of conflict. Quan-
titative levels of disagreement and modes of expressing dis-
agreement are treated as separate independent variables and
manipulated by employing a confederate.

Task

The study employs a racial intergration problem, de-
veloped by Rappoport (1966). In his study, the task required
subjects to judge the general level of integration in 30
different communities that were each represented on a 4" x 6"
card.

On the face of each card, subjects were given the three
cues shown below:

Specific Levels of Integration in Community

(1) Education   Low Below Average Above Average High
(2) Housing   Low Below Average Above Average High
(3) Job
    Opportunities   Low Below Average Above Average High

On the basis of the three cues, they were to judge the
general level of integration which exists in the community.
The subjects were to choose one of the nine levels of the
distal variable as shown below:

General Level of Integration in Community

Minimum	Above Average
Very Low	High
Low	Very High
Below Average	Maximum
Average	

As an example, three cues have been underlined, with
the corresponding correct distal variable underlined, as
based on the following cue validities:

Education	.01	
Housing	-.16	$R^2 = .85$
Job Opportunities	.91	

These cue validities are arbitrary in that they are
not based on real data concerning communities' racial
integration situation. An earlier study, referred to above,
used this kind of task with these validities and it was found
that subjects learned to rely on the high validity cue well
above chance levels.

In the present study subjects judge the general level
of integration in 20 different communities. On 12 of the
20 cards, called critical cards, the initial disagreement
between the naive subject and the confederate is predeter-
mined. The confederate is instructed to disagree by certain
fixed amounts. However, on the other eight cards, called
noncritical cards, the confederate always agrees with the
naive subject. These agreement trials were inserted at
various points in the 20 card series to keep the naive subject
from becoming suspicious.

Independent Variables

Conflict is manipulated in instructing the confederate to show different quantitative levels of disagreement. On critical cards he disagrees by 2, 3, or 4 units of the distal variable. For example, if the level of disagreement is specified as 2 units of the distal variable and the naive subject judged the general level of integration to be minimum, then the confederate's answer would be low.

Various considerations determined the choice of these three quantitative degrees of conflict. First, it should be noted that disagreement by one unit of the distal variable is omitted as being of no fundamental interest. In previous research it has been observed that subjects who disagree by such a minimal amount do not perceive this discrepancy between their judgments as serious. They frequently handle the discrepancy by agreeing to capitulate to each other on alternative cards. Moreover, a one unit discrepancy between their judgments does not give the opportunity to compromise. Disagreement by 2 units was chosen because it is a relatively small amount of conflict, but offers a chance for perfect compromise. Each subject can move to a central point; that is, in the minimum vs. low disagreement subjects may agree on very low. Disagreement by 3 was chosen because while it offers a chance for compromise, a perfect compromise cannot be reached. Here, the only compromise possible requires one

subject to change his judgment by 2 units and the other to
change by 1 unit. Disagreement by 4 units was of interest
because it represents an extreme case. In prior research,
discrepancies of this magnitude were seldom observed. The
present study therefore provides an opportunity to explore
effects of extreme disagreement for the first time. A full
range of outcomes are possible here. Perfect compromise can
occur with both subjects altering their judgments by 2 units
of the distal variable. Extreme capitulation can occur if
one subject abandons his own judgment to accept that of his
partner. And unbalanced forms of compromise can occur if
both partners alter their original judgments, but one moves
further than the other.

The second independent variable manipulated is the manner
in which disagreement is expressed. It is quite obvious in
everyday life that persons can express a constant amount of
disagreement in a variety of ways which may either antagonize
or conciliate the other. While it is clearly impossible to
manipulate such relevant factors as tone of voice, emphasis,
facial expressions, and gestures, it was possible to define
expressions of disagreement as either persistent or acquies-
cent. In the persistent condition, the confederate is in-
structed to state his discrepant judgment twice. That is,
regardless of how the naive subject responds to his first
statement, the confederate repeats it a second time. But in
the acquiescent condition the confederate states his discrepant

judgment only once. The confederate, in both the acquies-
cent and persistent conditions, must eventually agree with
the naive subject. However, in the former case he accepts
the naive subjects' suggestion after one disagreement; in
the latter case he accepts the naive subjects' suggestion
after two disagreements.

Design

The use of a confederate introduces certain methodo-
logical problems. One obvious question that arises concerns
generalizing results beyond the particular confederate used.
In an effort to cope with this problem, the present study
employed two very different confederates; one is a 22 year
old male majoring in Speech; while the other is a 20 year
old female majoring in Psychology. The problem of idio-
syncratic differences restricting the generality of results
is therefore controlled in two ways. First, all results are
averaged across the two different confederates. Second, a
test for the effects of idiosyncratic differences can be made
by comparing results obtained with each confederate separately.

The study is designed so that confederates are counter-
balanced across all conditions of conflict; both quantita-
tive and qualitative. As can be seen in the schematic dia-
gram below, the two confederates each work with five subjects
in the six experimental conditions. (See Figure A).

Both confederates went through a short training period,

where each memorized a "script." The script specified the
judgments they were to make and also the words to be used
in making them. As mentioned earlier, it is ultimately
impossible to control every subtle cue put forth by the
confederate, but this type of variance should distribute
itself across the various conditions randomly so as not
to bias results.

Research Plan

In general, naive subjects are paired with a confederate
to work under conditions in which the confederate disagrees
by fixed amounts, and expresses his disagreement in either
a persistent or acquiescent fashion. A 3 x 2 factorial
experiment is employed, with three levels of quantitative
disagreement and two types of expression as independent
variables. Three aspects of cognitive conflict are studied
as dependent variables: (1) learning; (2) conflict resolu-
tion or compromise; and (3) cognitive change.

Measures

Learning is measured in terms of subjects' error scores.
An error is defined as the difference between a given judg-
ment and the correct value of the distal variable being
judged. Error scores are computed for a subjects' first
private judgment, the joint judgment to which he agrees, and
the second private judgment he eventually makes for each card.

		1	2	3
Conflict Expressions	Persistent	male confederate (n 5)	male confederate (n 5)	male confederate (n 5)
		female confederate (n 5)	female confederate (n 5)	female confederate (n 5)
	Acquiescent	male confederate (n 5)	male confederate (n 5)	male confederate (n 5)
		female confederate (n 5)	female confederate (n 5)	female confederate (n 5)

Fig. A. SCHEMATIC ILLUSTRATION OF THE RESEARCH DESIGN

Conflict resolution is examined in terms of two measures:
(1) compromise; and (2) yielding. Compromise is measured by
computing a difference score; which is arrived at by the
formula $(S_1 - J) - (S_2 - J)$; where $(S_1 - J)$ is the difference
between the naive subjects' private judgment and the joint
answer to which he agrees, and $(S_2 - J)$ is the difference
between the confederates' judgment and the joint judgment
which is agreed upon. A difference scores of 0 or 1 is
counted as compromise. Yielding is measured by the formula
$(S_1 - J)$ which is the difference between a person's private
judgment and the joint judgment to which he agrees. The
higher the score, the greater the amount of capitulation the
subject has shown in agreeing to a joint answer.

Cognitive Change $(S_1 - S_1')$ is measured by computing
the difference between a subject's first private judgment
(S_1) and his second private judgment (S_1'). This measure
allows one to detect any change that may occur as a result
of one partner influencing the other and/or the naive subject
learning new cue values during the common task. All of these
measures will be examined as a function of the independent
variables.

Subjects

Sixty undergraduate volunteers were drawn from intro-
ductory Psychology classes. Males and females were used.
In so far as it was possible they were distributed equally

across the different experimental conditions, and the different confederates. Each confederate ran 5 subjects in each condition, and of the 5, 2 were of one sex and 3 were of the other. Out of the 60 subjects, 32 were male and 28 female. One hour was allotted for testing each pair.

Procedures

Confederate Training. At the outset of the experiment, both confederates were given a set of instructions and a brief training period. First, they were always to wait for the naive subjects' initial judgment. After the naive subject states his judgment, the confederate, in the acquiescent condition, must disagree by the predetermined amount and thereafter he must (1) never repeat his own judgment; (2) always be noncommittal; and (3) agree with suggestions of the naive subject. In the persistent condition the confederate must also disagree by the predetermined amount. But regardless of how the naive subject responds, the confederate must then repeat his discrepant judgment. Once he has repeated himself, he is noncommittal and must agree with suggestions of the naive subject. (Verbatim instructions for both conditions are given in appendix A.)

The amount of disagreement expressed by the confederate was specified in advance, depending upon which experimental condition was being run. Furthermore, the direction of disagreement was also specified as follows. On critical

cards, if the naive subjects' first judgment was high (7, 8, or 9) on the distal variable, the confederate always replied with a judgment that was lower by the predetermined amount. If the naive subjects' judgment on the distal variable was low, (1, 2, or 3), the confederate always responded with a judgment that was higher by the predetermined amount. If the naive subject gave a central judgment (4, 5, or 6,) the confederate would alternate his answer, going higher by the predetermined amount one time and lower the next time. In the high disagreement condition the confederate had a choice of direction only if the naive subject suggested 5 (Average) in which case the alternation rule was followed. Otherwise, the direction was fixed. For example, if the naive subjects' judgment was 6 (Above average) in order for the confederate to differ by 4 units on the distal variable, he had to respond 2 (Very low) as there is no value on the distal variable higher than Maximum, which is only 3 units higher.

Upon the arrival of the naive subject and confederate, they were escorted to the experimental room and given instructions. It was explained to them that the purpose of the experiment is to study the way people make judgments about racial integration matters. They were told that the material had been collected in cities and towns all over the United States and each card represented a city, however, no information would be given as to the name of the city or the section of the country from which it was taken. They were told that it was a novel task and that our aim was to find out how well people could do when they work together. Their task was to

examine the three cues and then estimate the general level
of integration in that community. Both subjects were
instructed to first examine the card individually and write
down a private judgment on their private answer sheets.
Then they could discuss their answers in any manner they
chose in order to arrive at a joint answer. Their joint
answer was recorded by E. It was necessary for the confed-
erate to wait for the naive subject to reveal his private
judgment first so that the confederate could disagree by
the predetermined amount. After arriving at a joint judg-
ment, they were instructed to once again examine the card
and make a second private judgment, which they would not
reveal to each other. They were told that this was just to
get a record of their personal impression. When both sub-
jects had written down a second private judgment, E turned
the card over and the correct answer was exposed. Then they
were instructed to go on to the next card and repeat the
process until they had completed all 20 cards. (For verbatim
instructions see appendix B.)

The experiment was conducted in a small room which
contained a one-way observation mirror. The subjects were
both seated at one-armed chairs facing E, who was seated
behind a small table. A screen was set up between the sub-
jects which prevented them from seeing each other's private
answer sheets. The room was equipped with a microphone, which
allowed the verbal interactions of the naive subject and the

confederate to be tape recorded.

RESULTS

Conflict Resolution

Compromise.

A 3 x 2 x 2 analysis of variance was planned to compare the effects of disagreement levels, modes of expressing disagreement, and confederates. However, because the range of disagreement scores possible in different experimental conditions varies from 2 to 4, the data were examined to determine whether they satisfied the homogeneity of variance rerequirement for parametric analysis. Hartley's maximum - F test revealed heterogeneity of variance which was corrected by applying a $\sqrt{x + 1}$ transformation to the data.

Analysis of variance performed on the transformed compromise scores shows significant main effects for levels of disagreement ($F_{2,48} = 20.48$, $\underline{p}$ .001) and modes of expressing disagreement ($F_{1,48} = 5.16$, $\underline{p}$ .05, See Table 1). There is no significant effect for confederates and no significant interaction effects. Individual comparisons of the mean compromise scores obtained for the three levels of disagreement were carried out using Fisher's Least Significant Difference test (See Table 2). Results show no significant difference between compromise scores for the high and medium disagreement conditions, but both differ significantly from the mean obtained in the low disagreement condition. It

Table 1

Summary of Analysis of Variance of the Mean
Compromise Scores (Transformed Data)

Source of Variance	SS	dF	MS	F
A (Mode of expressing disagreement	.160	1	.160	5.16*
B (Levels of disagreement)	1.270	2	.635	20.48***
C (Confederates)	.001	1	.001	N.S.
AB	.160	2	.080	N.S.
AC	.020	1	.020	N.S.
BC	.001	2	.001	N.S.
ABC	.025	2	.012	N.S.
W/Cells	1.495	48	.031	
Total	3.132	59		

1. The within term was the denominator for all F tests.
*   p .05
***   p .001

Table 2

Comparisons of Mean Compromise Scores
(Transformed Data)

Levels of Disagreement	High	Medium	Low
Original Data Means	2.276	2.152	1.20
Transformed Data Means	1.745	1.743	1.436

LSD = .11 Means lying above the same horizontal line are
not significantly different; those over
different lines are.

is therefore clear that compromise is maximal when the amount of disagreement is low and when it is expressed in an acquiescent manner.

The compromise data are plotted across the 12 critical trials in Figures 1 and 2 to show the effect of successive trials on the two independent variables. Inspection of these figures shows virtually no trials variance for either levels or modes of expressing disagreement.

Another aspect of conflict resolution may be termed _yielding_ or _capitulation_, that is, the tendency to accept the others' judgment. Once again, heterogeneity of variance was suspected because it is possible to obtain different maximum yielding scores in the high, medium and low disagreement conditions. Hartley's maximum - F test indicated heterogeneity which was corrected by again applying a $\sqrt{x+1}$ transformation.

An analysis of variance computed on the transformed yielding scores shows significant main effects for both levels of disagreement ($F_{2,48}$ = 6.54, p .005) and modes of expressing disagreement ($F_{1.48}$ = 27.31, p .001; See Table 3). Application of Fisher's Least Significant Difference test indicates no significant difference between yielding scores in the medium and high disagreement conditions, but both of these conditions produce significantly higher yielding scores than the low disagreement condition (See Table 4). Mean yielding scores for the three disagreement
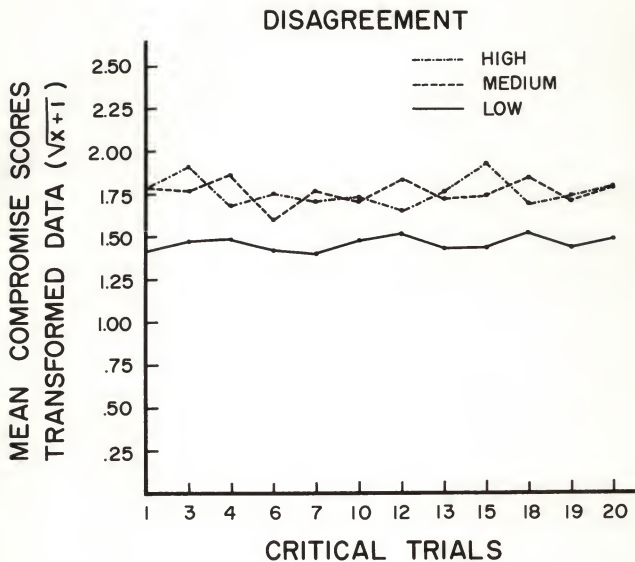
FIG. I.   MEAN COMPROMISE SCORES OBTAINED IN
THE THREE DISAGREEMENT CONDITIONS
PLOTTED AS A FUNCTION OF CRITICAL
TRIALS.
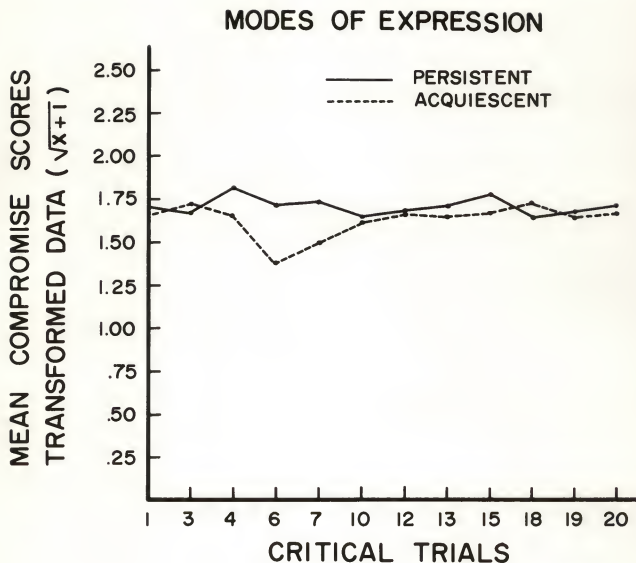
FIG. 2. MEAN COMPROMISE SCORES FOR Ss IN THE ACQUIESCENT AND PERSISTENT CONDITIONS PLOTTED ACROSS THE 12 CRITICAL TRIALS.

Table 3

Summary of Analysis of Variance of the Mean
Yielding Scores (Transformed Data)

Source of Variance	SS	dF	MS	F
A (Mode of expressing disagreement)	.71	1	.71	27.31****
B (Levels of disagreement)	.34	2	.17	6.54***
C (Confederates)	.05	1	.05	N.S.
AB	.03	2	.015	N.S.
AC	.00	1	.00	N.S.
BC	.00	2	.00	N.S.
ABC	.06	2	.03	N.S.
W/Cells	1.23	48	.026	
Total	2.42	59		

1. The within term was used for all F tests.
**** p .001
*** p .005

Table 4

Comparisons of Mean Yielding Scores
(Transformed Data)

Levels of Disagreement	Medium	High	Low
Means of Original Data	1.862	1.699	1.242
Transformed Data Means	1.650	1.590	1.470

LSD = .10 Means lying above the same horizontal line are not
significantly different; those over different
lines are.

conditions (transformed data) are plotted across the 12
critical trials in Figure 3. Figure 4 shows the mean
yielding scores (transformed data) for the two modes of
expression for the 12 critical trials. Inspection of the
two figures indicates little trial variance occurred.

Cognitive Change.

Subjects' cognitive change scores, that is, the dif-
ference between their first and second private judgments on
each critical trial, were also subjected to a 3 x 2 x 2
analyses of variance (See Table 5). The only significant
F ratio obtained is for the main effect of disagreement
levels ($F_{2,48} = 7.76$, p_ .005). Fisher's Least Significant
Difference test shows that cognitive change is significantly
greater in the medium disagreement condition than in either
the low or the high disagreement conditions (See Table 6).
The latter two conditions produce no significantly different
effects on cognitive change. Data for the three disagree-
ment groups are plotted across trials in Figure 5. Examina-
tion of Figure 5 shows that after the first two critical
trials, cognitive change is consistently highest in the
medium disagreement condition. However, the data plotted
on the last two trials suggests an interaction between trials
and disagreement conditions. Further analysis were carried
out on the data for these two trials (19 and 20, see Table 7).
Fisher's Least Significant Difference test shows a signifi-
cantly greater amount of cognitive change occurred in the
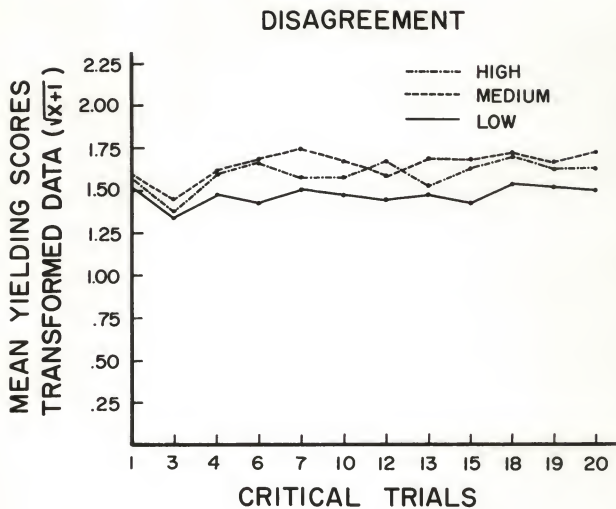
FIG. 3. MEAN YIELDING SCORES OBTAINED IN THE
THREE DISAGREEMENT CONDITIONS PLOTTED
AS A FUNCTION OF CRITICAL TRIALS.
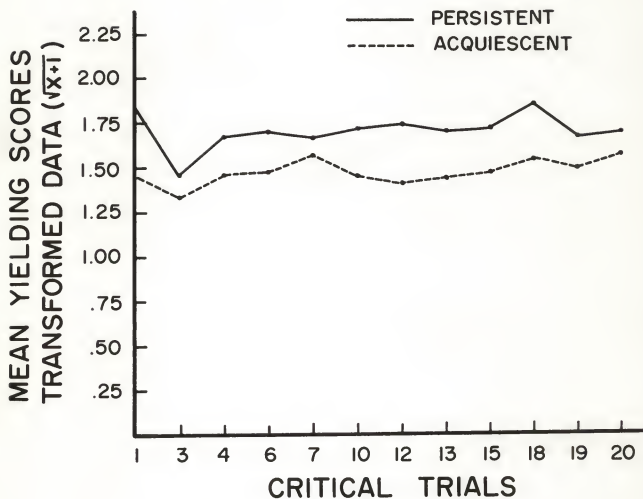
FIG. 4. MEAN YIELDING SCORES FOR Ss IN THE
ACQUIESCENT AND PERSISTENT CONDITIONS
PLOTTED ACROSS THE 12 CRITICAL TRIALS.

Table 5

Analysis of Variance of Mean
Cognitive Change Scores

Source of Variance	SS	dF	MS	F
A (Modes of expressing disagreement)	.48	1	.48	N.S.
B (Levels of disagreement	2.63	2	1.32	7.76***
C (Confederates)	.23	1	.23	N.S.
AB	.18	2	.09	N.S.
AC	.11	1	.11	N.S.
BC	.09	2	.045	N.S.
ABC	.04	2	.02	N.S.
SS w/Cells	7.95	48	.17	
Total	11.71	59		

1.. The within term was the denominator for all F tests.
*** p .005

Table 6

Comparisons of Mean Cognitive Change Scores

Levels of Disagreement	3	2	4
Means	1.308	.917	.825

LSD* = .26 Means lying above the same horizontal line are
not significantly different; those over
different lines are.
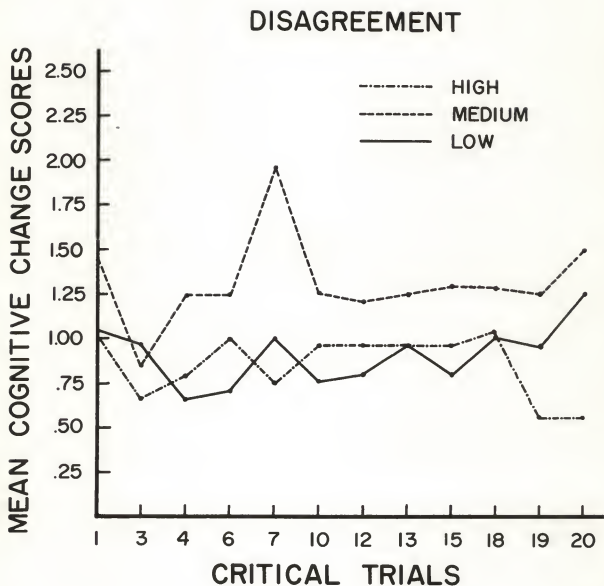
FIG. 5. MEAN COGNITIVE CHANGE SCORES OBTAINED IN THE THREE DISAGREEMENT CONDITIONS PLOTTED AS A FUNCTION OF CRITICAL TRIALS.

Table 7

Analysis of Variance of Cognitive Change Scores
for the Last Two Trials (11 & 12)

Source of Variance	dF	SS	MS	F
Levels of disagreement	2	7.06	3.53	10.09****
Error	57	19.69	.35	
Total	59	26.75		

1. The within term was the denominator for all F tests.
**** = p .001

medium and low condition than in the high disagreement
condition (See Table 8). While the medium disagreement
condition still shows the greatest amount of cognitive
change, it is not significantly different from the low con-
dition.

Learning.

Error scores based on the discrepancy between each
subject's judgment and the correct value of the distal
variable being judged were computed for all critical trials.
Three different scores were obtained for each subject; errors
associated with his first private judgment; the joint judg-
ment to which he agreed; and his second private judgment.
Analysis of variance carried out on the error scores of the
two private judgments show no significant main effects or
interactions. Analysis of joint judgment errors, shown in
Table 9, however, reveals a significant main effect for
disagreement levels ($F_{2.48} - 3.67$, $\underline{p}$ .05). No significant
effects were found for modes of expression or confederates
and there were no significant interactions. Application of
Fisher's Least Significant Difference test to the disagree-
ment levels data demonstrates that the variance here is
mainly due to the difference between error scores in the high
and low disagreement conditions (See Table 10). Subjects in
the high condition make significantly greater errors than
subjects in the low condition. Errors in the medium condition
are not significantly different from those made in either

Table 8

Comparison of Mean Cognitive Change Scores
(Last two trials)

Levels of disagreement	Medium	Low	High
Means	1.375	1.10	.50

LSD* = .39   Means lying above the same horizontal line are
not significantly different, those over
different lines are.

Table 9

Summary of Analysis of Variance for Mean
Error Scores on Joint Judgment

Source of Variance				
A (Mode of expressing disagreement)	.34	1	.34	$2.27^{N.S.}$
B (Levels of disagreement)	1.10	2	.55	3.67*
C (Confederates)	.21	1	.21	N.S.
AB	.38	2	.19	N.S.
AC	.01	1	.01	N.S.
BC	.20	2	.10	N.S.
ABC	.40	2	.20	N.S.
W/Cells	7.16	48	.15	
Total	9.80	59		

1. The within term was used for all F tests.
* = (p .05)

Table 10

Comparisons of Mean Error Scores on
Joint Judgment

Levels of disagreement	4	3	2
Mean	2.095	1.872	1.770

LSD* = .25 Means lying above the same horizontal line are
not significantly different; those over
different lines are.

the high or low conditions.

Mean error scores for each disagreement condition are plotted across the 12 critical trials in Figure 6. Examination again indicates no systematic trial variance.

DISCUSSION AND CONCLUSIONS

In general the results of this study demonstrate that variations in both quantity and quality of disagreement had important effects on the major dimensions of cognitive conflict.

Before discussing specific findings, it should be noted that none of our results indicate an important confederates effect. And this point is all the more striking because the confederates were deliberately selected as very different types. Various reasons may explain why the anticipated confederate artifact did not materialize. The two students serving as confederates were highly motivated; seriously interested in the research. They were carefully rehearsed in the procedures pertaining to the different experimental conditions, but no attempt was made to inhibit their natural social styles. Furthermore, because the structure of the task was such that confederates were only required to role-play on intermittent trials, it is likely that idiosyncratic factors did not have cumulative effects. The spacing of critical trials may also explain the absence of any general trials effect. It may of course be argued that two confederates
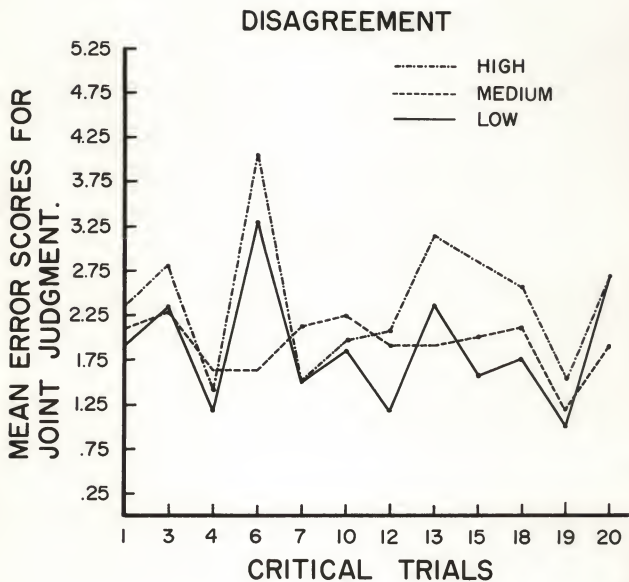
FIG. 6   MEAN ERROR SCORES OBTAINED IN THE
         THREE DISAGREEMENT CONDITIONS PLOTTED
         AS A FUNCTION OF CRITICAL TRIALS.

do not make a population, even if they are extremely different from one another. However, while it cannot be denied that the use of additional confederates would have strengthened the design, the fact that confederate effects nowhere approach significance offers strong support for the generality of the results.

Results show very clearly that compromise occurs most frequently when disagreement is low and expressed in an acquiescent manner. The relative degree to which these two variables influence compromise may be assessed by inspecting the levels of significance in Table 1. The level of significance for modes of expression is .05 while the level of significance for levels of disagreement is .001. Thus, while both are significant determinants of compromise, the quantitative degree of disagreement appears much more important than the persistence with which it is expressed.

Observations of subject's behavior during the experiment suggest a straightforward explanation for these findings. Many naive subjects reacted to the initial disagreement on critical trials by re-evaluating their own judgment and offering to modify it. The only reasonable modification possible in the low disagreement condition is to change by one unit of the distal variable in the direction of the confederate. Such a one unit change puts them at the perfect compromise point. Furthermore, it will be recalled that the acquiescent condition requires confederates to agree with the naive S

after the initial statement of disagreement. Subjects'
tendency to reevaluate their positions taken together with
restraints of the research design therefore provide an
economical explanation for the maximum compromise result.

The above interpretation also fits the data obtained
in the medium disagreement condition quite well: no perfect
compromise point is available to subjects here and less com-
promise is found. But, if the suggested explanation is
correct, why should compromise not be high in the high dis-
agreement condition? Both the low and high conditions
present perfect compromise points. The only explanation
for this difference that is consistent with the general in-
terpretation above is that while naive subjects re-evaluate
and offer to change their judgment by one unit quite easily,
they are more reluctant to change by two units. Furthermore,
E often noted that subjects would look upon a two unit (low)
disagreement as plausible, but would greet a four unit (high)
disagreement with remarks of surprise or astonishment. It
seems obvious that compromise cannot be predicted simply
according to the availability of perfect compromise points.

Empirical evidence for this interpretation was sought
by examining the cognitive change scores discussed below.
If the interpretation suggested here is correct and subjects
genuinely re-evaluate their initial private judgments when
disagreements occur, then such re-evaluations should lead to
cognitive change. Our interpretation suggests that cognitive

change would be greater in the low than in the high dis-
agreement condition. The mean cognitive change scores for
low, medium and high conditions are .917, 1.308, and .825
respectively. This is in support of the above interpreta-
tion although the difference between the high and low condi-
tion is not significant.

Inspection of Figure 5 shows immediately that cognitive
change is maximum in the medium disagreement condition. The
obvious explanation for this finding, especially when it is
coupled with the finding that change scores in the high and
low disagreement conditions appear almost identical, must
be in terms of an assimilation-contrast phenomenon. Research
concerning attitude change has demonstrated that change can
be seen as a function of the discrepancy of the change
messages from the position of the subject. Thus Hovland,
Harvey, and Sherif (1957) found subjects whose own stand
diverged widely from that advocated in communication per-
ceived the communication as further removed from their own
stand than it was (contrast effect). They also report that
subjects whose own stands are close to the position advo-
cated perceive the communication as closer to their own
position than it was (assimilation effect). In the high
disagreement condition, there is little cognitive change
because subjects apparently contrast the confederate's
judgment with their own. In the low condition, it seems
reasonable to suppose that the discrepancy appeared small

enough for it to be _assimilated_ to the naive subject's own judgment. But in the medium disagreement condition subjects apparently perceive the confederate's judgment both as different from their own and plausible, hence cognitive change is greatest in this condition.

No differences were found between the two modes of expressing disagreement for cognitive change scores. It would thus appear that persistence exhibited by the confederate has no effect on the cognitive change of the naive subject.

The finding that subjects _yield_ to the confederate less in the low condition than in either the medium or high disagreement condition, also can be related to experimental constraints. In the low disagreement condition it is only possible for subjects to obtain a yielding score of 2, while the possible scores are 3 and 4 in the medium and high disagreement conditions. However, if the results here were entirely due to experimental constraints, we would expect to find the greatest yielding in the high condition. Instead, we find maximum yielding in the medium disagreement condition. An inspection of Figure 4 shows that there is much more yielding in the _persistent_ condition than the acquiescent condition. In sum, maximum yielding occurred in the persistent condition where disagreement was either medium or high. Hence in the face of high persistent disagreement, subjects apparently tend to resolve their conflict in the easiest manner, by simply yielding to the confederate.

One general point should be made concerning the compromise and yielding measures. As was mentioned earlier, there is a chance for higher yielding and greater difference scores to appear in the high disagreement condition. However, it is also possible for them to be low. Evidence for this possibility can be found in Figures 1 and 3. Data plotted here make it clear that on the compromise measure there is little difference between the medium and high disagreement condition. While for the yielding data, the mean in the high condition is lower than in the medium condition. The data therefore do not indicate that all the findings are an artifact of the response range available to subjects.

To study learning, error scores were computed for the subjects' first private judgment, his joint judgment, and his second private judgment. No significant differences were found except on the error scores for joint judgments: errors were greatest in the high disagreement condition and lowest in the low disagreement condition. Large disagreements therefore appear to have a negative effect on performance of the joint task. But since no differences were found for error scores on the second private judgment, it is clear that subjects were agreeing to judgments which they thought were incorrect. In general then, none of the results obtained here indicate a genuine relationship between learning and conflict. This is rather surprising, because it was assumed that the presence of a persistently disagreeing partner

would impede learning. It can only be concluded that subjects were able to maintain the integrity of their private learning processes despite the interference created by the confederate.

An additional surprising outcome of this study is that nowhere were any significant effects for trials observed. It was thought at the outset, that as high disagreement trials progressed, subjects would either become rebellious and completely reject the position of the confederate, or else they would lose interest and simply capitulate to the confederate. But none of the data plots indicate any systematic trials variance except for the last two trials on the cognitive change measure; and this is quite small. As was mentioned before, perhaps the spacing of critical trials restricted any trial variance.

Conclusions

The findings of this study show that both the amount of disagreement and the manner in which it is expressed have important effects on how subjects will behave in a cooperative judgment situation. When disagreements are small they are easily resolved through compromise. But larger, persistent disagreements are resolved by following a line of least resistance: yielding to the persistent partner. Results clearly indicate, however, that such yielding is a superficial psychological phenomenon. It is not

accompanied by cognitive change nor is it related to subjects' ability to learn the task.

These conclusions must obviously be qualified by the degree to which subjects see the task as personally important. It is presumed that the findings of the present study might have been quite different if the consequences of subjects' joint judgments involved something more serious than a potential cash reward.

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APPENDIX A

Instructions Given to Confederates For
Conflict Expressions

Acquiescent Condition

The confederate must do only one thing: After the naive subject makes his private judgment, the confederate must disagree by the predetermined amount and then thereafter;

must (1) Never repeat his own judgment
      (2) Always be noncommittal
      (3) Agree with suggestions of naive subject, but agreement should not be suggestive.

Exchange of private judgments between naive subject and confederate.

Naive subject	Confederate
(A) Repeats first judgment	(A) Agrees
(B) Asks for information or confederate's reasoning.	(B) Reflects: is noncommittal. Doesn't repeat own judgment. If direct question by naive S asking stooge to repeat judgment; Stooge doesn't—forgot, not important, etc.
(C) Agrees with stooge or may suggest compromise	(C) Stooge agrees— o.k.

Persistent Disagreement Condition

In this condition the stooge must here give his own judgment _twice_ and thereafter be noncommittal or agree.

Naive subject	Confederate
(A) Repeats own judgment	(A) Stooge repeats own judgment
(1) Could agree with stooge END	
(2) Could suggest compromise or repeat own judgment again	(2) Agree

(3) Could ask stooge for information

(3) Reflects: is noncommittal. Doesn't repeat own judg- ment. If direct question by naive S asking stooge to repeat J; Stooge doesn't--forgot, not important, etc.

(B) Asks for information or discussion.

(B) Stooge repeats own judgment with statement "I just thought it was a good answer" or something. Then he is noncommittal.

(C) Suggests a compromise after first disagreement with stooge.
(1) Naive could agree
(2) Could ask reason
(3) Repeats compromise

(C) Repeats own judgment.

(2) Stooge must be noncommittal.
(3) Stooge agrees.

APPENDIX B

Instructions Given to Each Subject

Instructions

We are doing an experiment to see how well people can judge racial integration matters. On the basis of research conducted in different communities throughout the country, it has been found that the general level of integration that exists in a community can be predicted according to the level of integration that exists in three specific areas; Education, Housing, and Jobs.

You will be given the level of integration that exists in the three specific areas as shown here: (E shows card to Ss).

Your task is to make a judgment as to what the general level of integration is in this community by choosing from among the nine following general levels. (# shows Ss the nine levels).

Because this is a novel task and people often do better if they work together, you will work together on this task.

Now here is the way you are to proceed. After examining the three specific levels of integration, you are to make your own personal judgment of the general level of integration. Then you and your partner will be allowed to reach a joint judgment of the general level of integration.

Before we turn the card over and let you see the correct answer we want you to make a second private (personal) judgment of the general level of integration. (This is just to get a record of your second personal impression).

Your performance will be evaluated in terms of your joint judgment. Its to your advantage to do as well as possible as the two most accurate subjects will be given a cash prize.

Scoring Explanation

Now the way we are scoring your performance is as follows: If your judgment is correct you will be given 2 points for that card. If your joint judgment is off by one number you will be given 1 point. At the conclusion of the 20 cards, your score will be added and the pair of Ss with the largest number of points will win the cash prize ($10.00).

COMPROMISE, LEARNING AND COGNITIVE CHANGE AS A
FUNCTION OF INDUCED COGNITIVE CONFLICT

by

RICHARD EARL WHARTON

B. A., University of Arizona, 1964

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AN ABSTRACT OF A THESIS

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The general purpose of this research was to investigate major dimensions of cognitive conflict i.e., learning, compromise, and cognitive change, as a function of different levels and types of disagreement. Levels of disagreement and modes of expressing disagreement were manipulated by employing a confederate. Three levels of quantitative disagreement were pitted against two modes of expressing disagreement: persistent and acquiescent. Each level of disagreement was paired with each mode of expression in a 3 x 2 factorial experiment.

In the experimental situation a naive subject was paired with a confederate to make a series of judgments concerning racial integration. Confederates were instructed to disagree with the naive subject on selected trials. Sixty undergraduate volunteers were drawn from introductory Psychology classes; 32 were male and 28 were female. Half of the subjects were paired with a female confederate and half with a male confederate. Ten subjects were ran in each of the 6 groups required by the design.

Results show that variations in both quantity and quality of disagreement has significant effects on the major dimensions of cognitive conflict. Compromise occurs most frequently when disagreement is low and expressed in an acquiescent manner. Maximum yielding to the confederate occurs in the persistent condition when disagreement is either medium or

or high. Results also show that cognitive change is maximum in the medium disagreement condition. No important findings were obtained for learning.