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# Children's Understanding of Uniformity in the Environment

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LOCKHART, KRISTI L.; ABRAHAMS, BARBARA; and OSHERSON, DANIEL N. *Children's Understanding of Uniformity in the Environment*. CHILD DEVELOPMENT, 1977, 48, 1521-1531. Children's ability to distinguish among those regularities in the environment governed by social convention and those governed by physical law was investigated in this study. 75 children from the first, third, and fifth grades were each asked a series of questions pertaining to 6 topic areas. 4 of these topics dealt with conventionality, one with moral rules, and another with physical laws. In each topic area such issues as the child's understanding of the convention, rule, or law and the child's belief in the universality of the convention, rule, or law were addressed by similar questions. 4 conclusions were drawn from the results: (a) Children's ability to distinguish between social convention and physical law increases with age. (b) In learning to make this distinction, many children pass through an intermediate stage where they believe, incorrectly, that both physical laws and social conventions can be changed. (c) Children's understanding of conventionality develops as an organized whole. (d) Some conventions are more difficult to change than others. Children are more reluctant to change moral rules than conventions.

As he develops the child becomes increasingly aware of two kinds of regularities in his environment, those governed by physical law and those governed by social convention. The regularities that result from the customs and conventions of the child's culture differ from those that are governed by physical law in that the former are arbitrary, that is, they exist only through mutual consent. Thus, society can decide to change the name of all lead writing instruments from "pencils" to "pens," but it cannot change the laws of gravity simply by means of a majority vote.

The available evidence suggests that the young child is not aware of the contractual nature of those uniformities resulting from social convention. For example, Piaget (1932) found that young children regard the rules of a game as if they were physical laws, that is,

as unalterable and God given. Similarly, Tapp and Kohlberg (1971) found that primary grade children were less likely to agree to change rules than older children. With regard to social conventions other than rules, Hess and Torney (1967) found that young children view the laws of the nation as unalterable. Likewise, the failure of young children to realize the arbitrariness of the meaning of words has been demonstrated by both Piaget (1929) and Osherson and Markman (1975). The similarity of these results suggests that children's understanding of social conventions develops as an organized whole. It is then natural to ask whether the development of children's understanding of moral rules is dependent upon their understanding of social conventions. Insight into the relationship between children's understanding of these two areas might help resolve the ongoing debate (see Turiel 1975)

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over whether moral rules are a special case of social convention.

The studies mentioned above indicate that the child's ability to distinguish between social convention and physical law develops gradually. Results from a pilot study suggest that as the child's thinking evolves it might pass through an intermediate stage where the child believes, incorrectly, that all things are alterable. Such a stage would be analogous to that stage in language development in which the child who is learning the past tense overgeneralizes and begins to incorrectly substitute "goed" for "went" (Brown 1965).

The following issues were investigated in the present study:

1. Does the young child fail to distinguish between social convention and physical law? If so, does his ability to distinguish between these two types of regularities increase with age? In addition, does the child's understanding of social conventions and his willingness to change such conventions increase with age?

2. As the child's understanding of regularities in the environment develops, does his thinking pass through an intermediate stage where he believes incorrectly that both physical laws and social conventions can be altered?

3. Does the child's understanding of social conventions develop as an organized whole? In addition, does the child's understanding of moral rules develop alongside his understanding of social conventions?

### Method

*Subjects.*—Twenty-five children were randomly selected from each of the following grade levels: first (6–7 years old), third (8–9 years old), and fifth (10–11 years old). There were 13 boys and 12 girls in each grade level. All children were from a public school in a middle-class residential district.

*Test items.*—Each child participating in the study was asked the same set of questions. The questionnaire may be conceptualized as

<sup>1</sup> It is worth contrasting traffic laws with laws pertaining to, say, larceny. In the former case, only uniformity of behavior is aimed for (i.e., it matters little which side of the street we drive on, so long as the populace behaves uniformly in this respect); in the latter case, more than uniformity motivates the law in that people may be ethically as well as legally enjoined to behave in one way rather than another, e.g., not to steal. We chose to investigate traffic-type laws rather than larceny-type laws so as not to confound purely legal concepts with purely ethical ones.

a  $6 \times 6$  matrix consisting of six sets of questions which are homologous across six distinct topics.

*Topics.*—Four topics dealt with social convention: meaning of words, rules of a game, laws of the state, and rules of etiquette. The other two topics were physical laws and moral rules. The children were questioned about specific instances of the general topics with which they had been found to be familiar in a pilot study. Stimulus materials accompanied the presentation of each set of topic questions. The topics, specific instances, and stimulus materials were as follows: meaning of words, name of cat and dog, pictures of a cat and dog; rules of the game, rules of hide-and-go-seek, picture of children playing hide-and-go-seek; laws of the state, the law concerning the side of the road on which cars are driven,<sup>1</sup> model highway and car; rules of etiquette, eating food with utensils rather than with one's hands, a picture of a table setting and food; moral rules, taking things that do not belong to one, a picture of desirable toys and their possible owners; physical law, specific gravity of rocks, a large, heavy rock.

*Questions.*—In order to study possible parallels in the child's understanding of these areas, the questions for each topic were homologous to one another (see table 1). Thus, in each topic area, similar question areas addressed the following issues:

0. *The child's familiarity with the specific instance of the topic.*

1. *The origins of the child's knowledge:* Has the child always known this convention, rule, or law to be true? If not, who taught it to him (questions 1–3)?

2. *The child's belief in the universality of the convention, rule, or law:* Does the child believe this convention, rule, or law exists all over the world? Does he believe there might exist a place or time where it is not like this (questions 4–6)?

3. *The child's understanding of the convention, rule, or law:* Does the child believe we could change this convention, rule, or law?

If everyone agreed to a change, would the child believe it was all right (questions 7–9)?

4. *The child's behavior with respect to a possible change in a convention, rule, or law:* If everyone agreed to change a particular con-

vention, rule, or law today, what would the child do? Would his behavior be "correct" (questions 10–11)?

5. *The child's behavior when visiting a strange place:* How would the child behave in another state with respect to a particular convention, rule, or law which we had agreed to change in California? Would the child behave the same way in another state as in his own state? Would that be the "right" thing to do (questions 12–13)?

6. *Another person's behavior in the child's state:* What would a stranger do in the child's state? Would that be the "right" way to behave (questions 14–15)?

These question areas were chosen in part because of their previous usage in other experiments. For instance, Piaget has used questions similar to the first four question areas in his own studies. The last two sets of questions were chosen in order to explore the child's understanding of cultural relativity.

*Procedure.*—The experimenter accompanied each subject individually from his classroom to the experimental room. The subject was seated at a table with the experimenter. The experimenter directed the subject's attention to the picture or object before him. The experimenter told the subject that she was interested in discovering what children thought about certain objects and rules and wanted to ask the subject some questions pertaining to such objects and rules. The experimenter emphasized that there were no right or wrong answers to the questions. The experimenter then proceeded to ask the subject the six sets of questions. The order in which the topics were presented was randomized across subjects. The questions within each topic, however, were presented in the same order each time.

Subjects were asked to give rationales for their answers to test items for which a simple "yes" or "no" answer might not accurately reflect the child's understanding, namely, questions 6, 8, 9, 12, and 14, within each topic. The experimenter was careful, however, not to coach subjects in their explanations. Subject's responses were written down by the experimenter as well as recorded by tape. Each session lasted approximately ½ hour.

*Scoring of responses.*—The initial question (question 0) in each topic area was not scored.

TABLE 1

AN EXAMPLE OF THE TEST ITEMS

Rules of the Game	
Question 0:	
a)	Do you know how to play "hide-and-go-seek?"
b)	When you play "hide-and-go-seek" who is usually "it"—the first person found or the last person found? (Check whether the child plays that the first person found is "it" the next time around, or the last person found is "it.")
Question 1:	
1.	Have you always known the rules of "hide-and-go-seek?"
2.	How did you know them?
3.	Did you know them when you were a baby?
Question 2:	
4.	Has "hide-and-go-seek" always had the same rules as it has now?
5.	Is it possible there was a time when it had different rules?
6.	Are the rules the same all over the world? Why, or why not?
Question 3:	
7.	Would it be possible to change the rules?
8.	Suppose that everyone in California got together, and we all agreed that from now on the person who was found (first/last, whichever is the opposite of the child's initial declaration of the rule) would be "it." Could we make that change? Why, or why not?
9.	Would it be all right to make that change? Why, or why not?
Question 4:	
10.	Suppose we did that today—everyone in California got together and we all agreed that from now on the person who was found (first/last) would be "it." If you were playing "hide-and-go-seek" tomorrow, how would you play—that the first person found would be "it" or the last person found?
11.	Would that be fair (if answer is that he will play by the new rule)? If you did play that the (first/last) person would be "it," would that be fair (if answer is that he will play according to the old rule)?
Question 5:	
12.	Suppose you went to another state. If you were playing "hide-and-go-seek" with some children who lived there, how would you play—that the first person found would be "it" or the last person found would be "it?" Why?
13.	Would that be fair?
Question 6:	
14.	Suppose that someone who lived in another state came to California, and he didn't know about the change we'd made. If he was playing "hide-and-go-seek" with you, how would he play—that the first person found would be "it," or the last person found would be "it?" Why?
15.	Would that be fair?

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The one child who failed this item was dropped from the study. The remaining 15 questions were scored individually. Each answer could receive a score of 0, 0.5, or 1.0; a score of zero is indicative of an immature response, a score of one reflects a mature answer.

The following exemplifies the scoring technique used:

*Question:* Suppose that everyone in California got together, and we all agreed that from now on we would drive on this side of the street when we were going in this direction and on that side when we were going in that direction. (Opposite from the way the child thinks it is now.) Could we make that change? Why, or why not?

*Answers:* Score of 0.0 = "No, God made the laws, we can't change them"; score of 0.5 = "No, someone might come in from another state and not know about our new law. He might crash into us"; "Yes, don't know why"; score of 1.0 = "Yes, because it really doesn't matter which side we decide to drive on as long as everyone agrees."

Thus, answers are marked 0.0 if the child shows no understanding of conventionality, moral rules, or physical law, whichever one the topic is concerned with. Answers are awarded a 0.5 if the child shows some understanding but is unable to offer an explanation or gives an irrelevant explanation. Responses are also scored 0.5 if the child, in spite of giving an immature "yes" or "no" response, provides a mature utilitarian or pragmatic rationale. A score of 1.0 is given to all answers which reflect a mature understanding. As seen in table 2, other test items were scored in a similar manner.

Test items within each of the six question areas were summed to produce an overall score for that particular question area. These sums were then divided by the number of test items that contributed to the final score of that area. This division resulted in equalizing the maximum score for each question area within each topic and setting this maximum score equal to 1.0. Thus, each child received 36 scores on the questionnaire, that is, six scores for each topic. The maximum number of points a child could receive for each topic across questions was 6. Similarly, the total number of points a child could receive for each question across topics was 6. Finally, the total overall number of points a child might be awarded was 36.

TABLE 2  
SCORING METHOD

Question 1:	
Item 1: Have you always known we were supposed to eat with a fork or a spoon?	
Answers:	0.0 = "Yes." 0.5 = "Don't know." 1.0 = "No."
Item 2: How did you know this?	
Answers:	0.0 = "I've always known it." 0.5 = "Don't know." 1.0 = "My parents (or someone) taught me."
Item 3: Did you know it when you were a baby?	
Answers:	0.0 = "Yes." 0.5 = "Don't know." 1.0 = "No."
Question 2:	
Item 4: Has it always been considered polite for people to eat with a fork or a spoon (rather than with their fingers)?	
Answers:	0.0 = "Yes." 0.5 = "Don't know." 1.0 = "No."
Item 5: Is it possible there was a time when it was polite to eat with your fingers?	
Answers:	0.0 = "No." 0.5 = "Don't know." 1.0 = "Yes."
Item 6: Is it like this all over the world—that it's considered polite to eat with a fork and a spoon (rather than with your fingers or some other way)? Why, or why not?	
Answers:	0.0 = "Yes, everyone eats the same way." 0.5 = "Don't know, I don't know how other people eat." 1.0 = "No, people in different countries eat in different ways."
Question 3:	
Item 7: Would it be possible to change this?	
Answers:	0.0 = "No." 0.5 = "Don't know." 1.0 = "Yes."
Item 8: Suppose that everyone in California got together and we all decided that from now on people would eat their food with their fingers and no one would use forks or spoons anymore. Could we make that change? Why, or why not?	
Answers:	0.0 = "No. It would be impolite to eat with your fingers." 0.5 = "No. It would be unsanitary." "Yes. Don't know." 1.0 = "Yes. Because we all agreed to change it."
Item 9: Would it be all right for us to make that change? Why, or why not?	
Answers:	0.0 = "No, it would be impolite." 0.5 = "Yes. Don't know." 1.0 = "Yes. It doesn't matter how you eat your food as long as we all agree."
Question 4:	
Item 10: Suppose we did that today—everyone in California got together and we all agreed that from now on no one would use forks or spoons anymore. If we did this today, how would you eat your food tomorrow (with your fingers or with a fork and spoon)?	
Answers:	0.0 = "With a fork and a spoon." 0.5 = "Don't know." 1.0 = "With my fingers."



TABLE 2 (Continued)

Item 11: Would that be polite (if answers he would eat with his fingers)? If you did eat with your fingers, would that be polite (if answers he would eat with a fork and a spoon)?

Answers: 0.0 = "No."  
0.5 = "Don't know."  
1.0 = "Yes."

Question 5:

Item 12: Suppose you went to another state. If you were eating with someone who lived there, how would you eat your food? Why?

Answers: 0.0 = "With a fork and a spoon—the same way we eat in California."  
"With my fingers."

0.5 = "Don't know. I wouldn't know the rules there."

1.0 = "I would eat the same way that they eat."

"With a fork and a spoon—the way that they would eat."

Item 13: Would that be polite?

Answers (if child says he will eat the same way he does at home, regardless of how the people there eat):

0.0 = "Yes."

0.5 = "Don't know."

1.0 = "No."

Answers (if child says he will eat the way the people there eat):

0.0 = "No."

0.5 = "Don't know."

1.0 = "Yes."

Question 6:

Item 14: Suppose that someone who lived in another state came to California and he didn't know about the change we'd made. How would he eat his food (with his fingers or with a fork or a spoon)? Why?

Answers: 0.0 = "With his fingers."

0.5 = "Don't know."

1.0 = "With a fork and a spoon, because he didn't know the new rule."

Item 15: Would that be polite?

Answers (if child says the stranger will eat the new way, with his fingers):

0.0 = "No."

0.5 = "Don't know."

1.0 = "Yes."

Answers (if child says the stranger will eat the old way, with a fork and a spoon):

0.0 = "Yes."

0.5 = "Don't know."

1.0 = "No."

*Scoring reliability.*—All children's responses were independently scored by two experimenters. Reliability of scoring was determined by dividing the total number of agreements by the combined number of agreements and disagreements. Any difference in a score assigned to an individual test item was counted as a disagreement. The average reliability obtained for scoring was 97%; differences were few and resolved by discussion.

## Results

*Sex differences.*—No significant sex differences were found,  $F(1,69) = 1.49$ , N.S.; therefore the scores of males and females were combined for subsequent analyses.

*Developmental trends.*—An analysis of variance indicated a significant main effect of grades,  $F(2,72) = 15.22$ ,  $p < .01$ . Further analysis using orthogonal polynomials revealed a significant linear trend,  $F(1,72) = 29.54$ ,  $p < .01$ ; the quadratic trend was not significant,  $F(1,72) = 0.908$ .

In order to determine whether children's ability to distinguish between conventionality and physical law increases with age, a closer analysis was made of question 4 (test items 10–11). This question area was chosen for analysis for the following reasons: (1) it included a check question that ascertained whether the child really believed the change was valid or not; (2) the question was less abstract in that it asked the child about his own behavior; and (3) since the item involved yes-no questions, scoring the answers did not require interpretation on the part of the experimenters.

In analyzing question 4, a mean conventionality score was obtained for each subject by averaging the scores of that individual on the four topic areas dealing with conventionality. A child is considered a mature responder for conventionality (C+) if his average score is greater than or equal to .75 (in terms of an unadjusted score, 6 out of a possible 8 points); otherwise, he is considered immature on conventionality (C-). Similarly, a child is considered a mature responder on the topic physical law (P+) if his score is greater than or equal to .75 (in terms of an unadjusted score, 1.5 out of a possible 2 points); otherwise, he is considered immature on physical law (P-). Thus, a C+P+ responder correctly makes the distinction between social convention and physical law. Figure 1 plots the frequency of C+P+, C+P-, C-P+, and C-P- responders to question 4. As seen in figure 1, the percentage of children who are C+P+ responders increases significantly over grades,  $F(1, \infty) = 9.35$ ,  $p < .01$ .

There are two types of children who fail to distinguish between social convention and physical law. A C+P- responder overgeneralizes and believes that both conventions and

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physical law can be changed through mutual consent. A C-P+ responder, on the other hand, refuses to change both. The percentage of children who make these types of mistakes decreases from 72% in the first grade, to 58% in the third grade, to 40% in the fifth grade (see fig. 1). C-P- responders are rare.

*Intercorrelations among topics and among questions.*—Table 3 shows the relationship be-

tween the score of an individual on one topic area as compared to another topic area. Across grades a subject's score on one area of conventionality is significantly related to his score on another area of conventionality. Table 3 also shows by grades the relationship between an individual's scores on different topics. In the first and third grades, the correlations between an individual's scores on the conven-

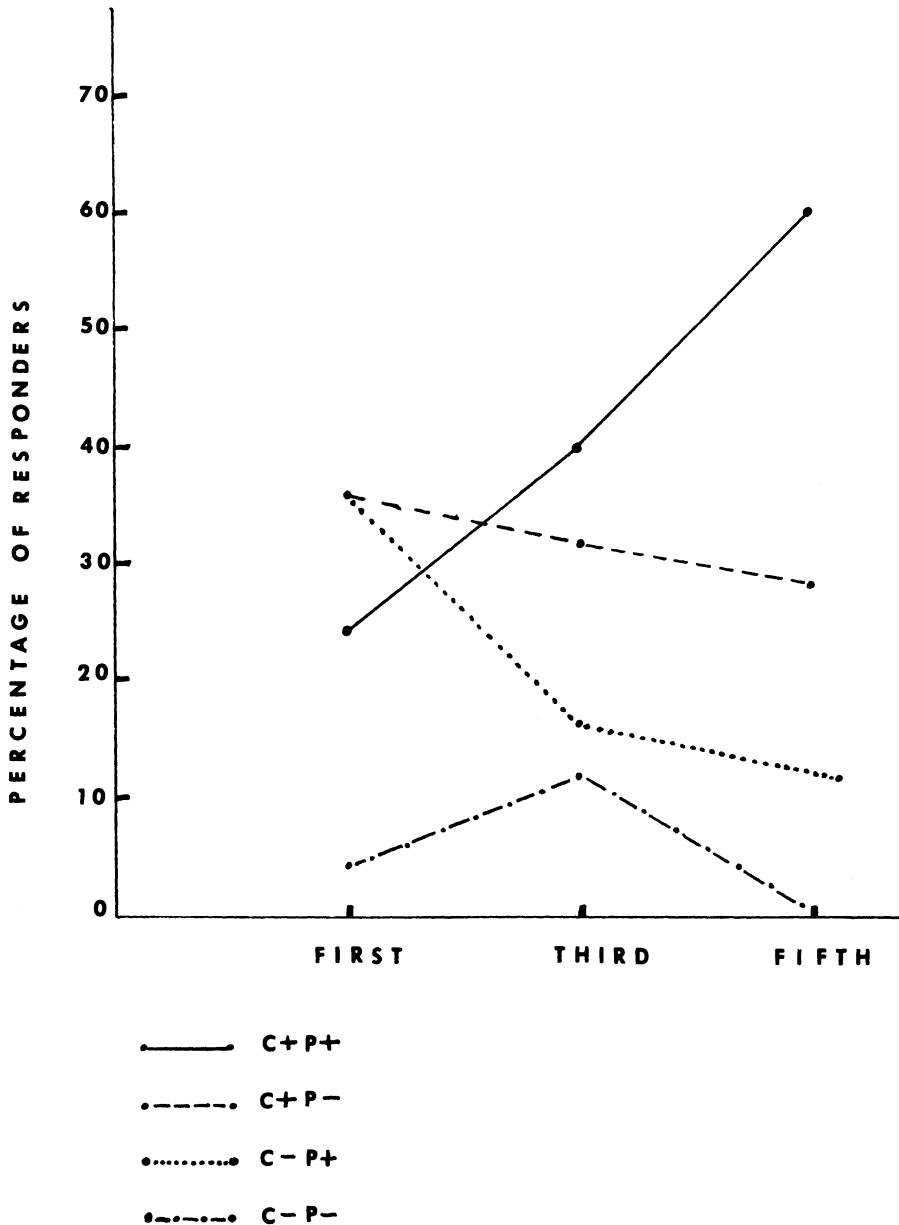


FIG. 1.—Frequency of C+P+, C+P-, C-P+, and C-P- responders to question 4 (C= conventionality, P= physical law; + = mature response, - = immature response).

TABLE 3

THE RELATIONSHIP BETWEEN A SUBJECT'S MEAN TOTAL SCORE ON TOPIC X AS COMPARED TO TOPIC Y

TOPIC X, TOPIC Y	OVERALL (N=75)		FIRST GRADE (N=25)		THIRD GRADE (N=25)		FIFTH GRADE (N=25)	
	r	t	r	t	r	t	r	t
W, RG.....	.628	6.90***	.549	3.55***	.490	2.69**	.591	3.51***
W, LS.....	.620	6.75***	.531	3.00***	.495	2.73**	.264	1.31
W, RE.....	.633	6.99***	.664	4.26***	.528	2.98***	.299	1.50
W, MR.....	.471	4.56***	.203	.99	.618	3.77***	.415	2.18**
W, PL.....	.247	2.18**	-.126	-.61	.542	3.10***	.011	.05
RG, LS.....	.507	5.03***	.467	2.53**	.343	1.75*	.311	1.57
RG, RE.....	.610	6.58***	.600	3.60***	.622	3.81***	.320	1.62
RG, MR.....	.416	3.90***	.417	2.20**	.344	1.76*	.193	.94
RG, PL.....	.097	0.83	-.231	-1.14	.462	2.50**	-.111	-.53
LS, RE.....	.661	7.52***	.739	5.27***	.470	2.55**	.515	2.88**
LS, MR.....	.414	3.89***	.412	2.17**	.168	.82	.386	2.01*
LS, PL.....	.152	1.31	-.091	-.44	.447	2.40**	-.211	-1.03
PL, RE.....	.172	1.49	-.363	-1.87*	.571	3.33***	-.051	-.24
PL, MR.....	.119	1.03	-.071	-.34	.186	.91	.052	.25
RE, MR....	.523	5.24***	.441	2.35**	.580	3.41***	.304	1.53

\*  $p \approx .10$ .  
 \*\*  $p < .05$ .  
 \*\*\*  $p < .01$ .

tionality topics are significant. Only in the fifth grade is there little relationship between an individual's scores; this appears to be due to a ceiling effect.

As seen in table 3, a positive relationship across grades was found between a subject's score on the topic moral rules and his scores on the four areas of conventionality. When broken down by grades, however, these inter-correlations were found to be weaker than those among conventions. In order to investigate further the relationship between moral rules and social conventions, a closer look was taken at question 4. In the first grade a significant positive relationship was found between a child's mean conventionality score and his score on the topic moral rules,  $r(23) = .55$ ,  $p < .01$ . Positive correlations between a subject's score on conventionality and his score on moral rules were also found in the third grade,  $r(23) = .33$ , and the fifth grade,  $r(23) = .20$ ; however, neither of these reached significance.

Across grades, a significant positive relationship was also found between an individual's scores on one question and his score on another question. Within grades, a positive relationship is consistently found between questions 3 and 4 (see table 1). These questions were earmarked at the beginning of the study as crucial, for they more than any other question get to the heart of conventionality.

*Overgeneralization.*—As seen in table 3, little relationship across grades was found between a child's understanding of conventionality and his understanding of physical law. This was seen as an initial indication that children were overgeneralizing. In order to further investigate this possibility, we again looked at question 4.

In the first grade a significant negative relationship, consistent with the overgeneralization hypothesis, was found between a subject's mean conventionality score and his score on physical law,  $r(23) = -.44$ ,  $p < .05$ . In the third grade, however, a significant negative correlation was not found,  $r(23) = -.02$ , probably due to the greater number of children in the third grade who have a good understanding of both physical law and social convention, that is, children who are C+P+ responders. Nonetheless, as seen in figure 1, a large percentage of third graders do overgeneralize (32%). Further evidence of overgeneralization in the third grade is seen in figure 2, which shows that, although third graders have a greater understanding of conventionality than do first graders, they do not necessarily have a greater understanding of physical laws. Indeed, approximately the same percentage of third graders say rocks will float as first graders (44% vs. 40%). This is further exemplified by the fact that a subject's mean score on conventionality differs significantly from his score on physical law in the third grade,  $t(24) =$



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1.79,  $p < .05$ , one-tailed test, but does not differ significantly in the first and fifth grades.

In the fifth grade, the number of overgeneralizers diminishes (28%). However, those fifth graders who do fail to make the physical law-conventionality distinction usually make

the mistake of overgeneralization (i.e., C+P-), supporting the proposition that overgeneralization is an intermediate stage.

*Relative difficulty of topics and questions.*  
—Analysis of variance revealed a significant topic effect,  $F(5.360) = 37.75$ ,  $p < .01$ . Using

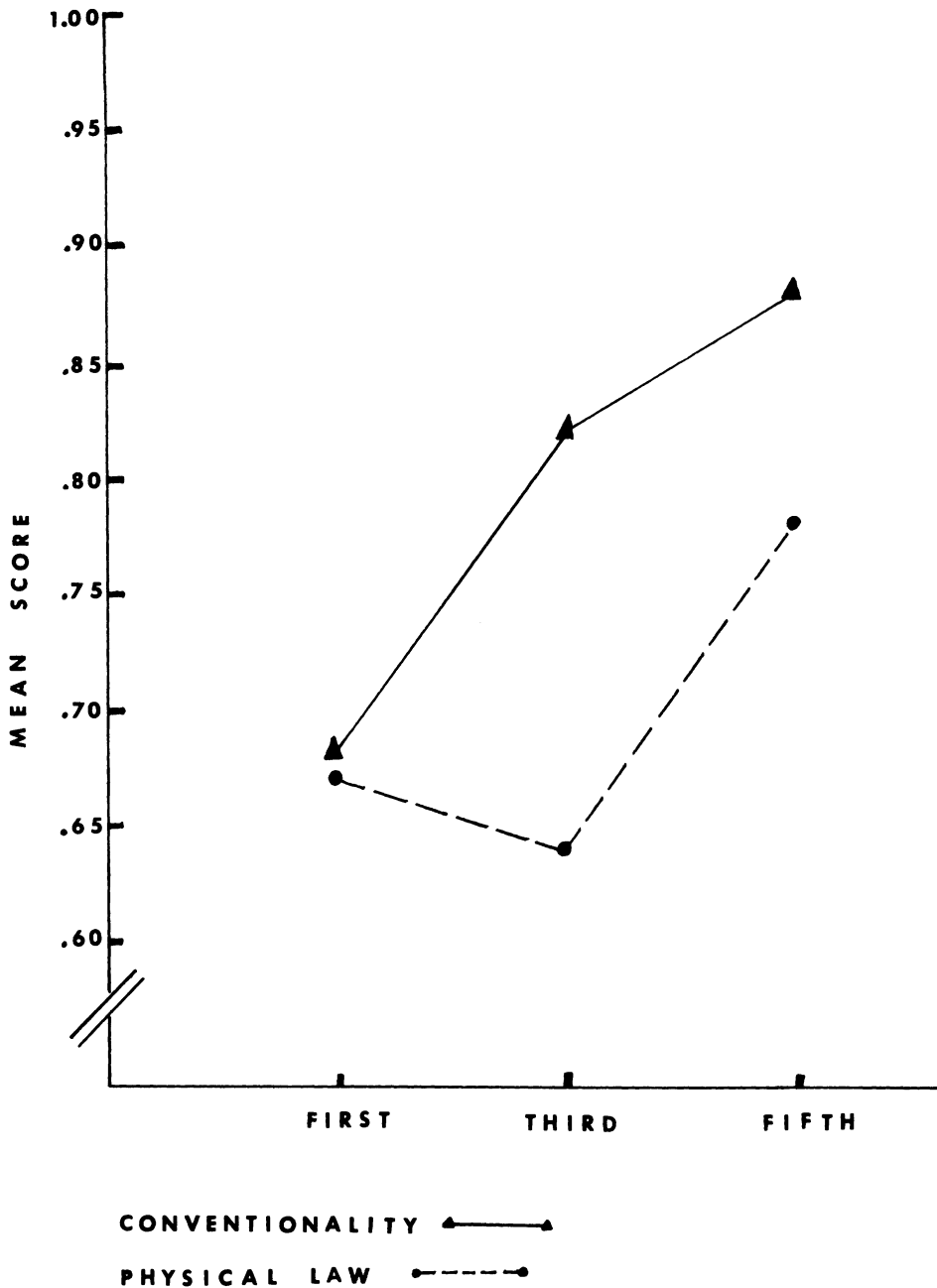


FIG. 2.—Mean scores of first, third, and fifth graders on question 4

a Scheffé test, significant differences were found among all pairs of means,  $F(5,444) \geq 11.15$ ,  $p < .05$ , except the following: meaning of words versus rules of etiquette,  $F(5,444) = .60$ , N.S.; rules of the game versus physical law,  $F(5,444) = 6.34$ , N.S.; and laws of the state versus physical law,  $F(5,444) = .938$ , N.S. Comparing the topic means, children were more reluctant to change moral rules, rules of etiquette, and the meaning of words than laws of the state and rules of the game.

In the analysis of variance a significant main effect of questions was also found,  $F(5,360) = 42.34$ ,  $p < .01$ . Using a Scheffé test, significant differences were found among all pairs of question means,  $F(5,444) \geq 11.15$ ,  $p < .05$ , except the following: origins of knowledge (question 1) versus child's behavior with respect to a change in convention (question 4),  $F(5,444) = 3.41$ , N.S. Questions pertaining to cultural relativity (questions 5 and 6) were easier for the children to answer than was question 2, which dealt with the universality and evolution of the particular law, rule, or convention.

In the analysis of variance, a significant question by topic interaction was found,  $F(25,2800) = 44.96$ ,  $p < .01$ . Graphing the data, however, revealed no obvious pattern in the variation.

## Discussion

The results indicate that children's ability to distinguish between physical law and social convention increases with age. Moreover, the results are consistent with the results of other studies that show that a child's willingness to change social conventions through mutual consent also increases with age.

First graders are reluctant to change through mutual consent most social conventions; they offer such rationales as: "Because it wouldn't be right [or polite or fair]," or "Because God doesn't want it that way." Even those children who agree to change the conventions do not show a mature understanding of why such uniformities can be changed, answering with such responses as "don't know" or "because it would be fun." As seen in figure 1, few children in the first grade show a mature understanding of both conventionality and physical law.

By the third grade, a majority of children

believe that conventions can be changed by a majority vote. Furthermore, even those children who do not agree to change the rules usually give utilitarian or pragmatic rationales: "We couldn't [change the traffic laws] because people from another state might not know the new law and might crash into us when they visited," or "Everyone would get confused." Those third graders who agree to change social conventions through mutual consent display in their responses a primitive understanding of the arbitrariness of such uniformities: "Would be easy [to change]; just get rid of traffic signs [or knives, forks, and spoons, or names]," or "The change wouldn't hurt anybody." As shown in figure 1, by the third grade some children are also beginning to draw the distinction between social convention and physical law: "You can change [rules of the game] because it's not something in nature; it's something anybody can change."

By the fifth grade, most children agree that conventions can be changed and realize that they are arbitrary and contractual in nature. Answers frequently given by the fifth graders are: "Doesn't matter which way you do it as long as everyone agrees to it," or "It's just a name and any name can be changed. I could be called an 'elephant,' and an 'elephant' could be called a 'person.'" A majority of fifth-grade children make a clear distinction between those uniformities governed by physical law and those governed by social convention: "You can't change nature by a vote."

Another finding of this study is the existence of a stage, for many children, during which they are willing to change not only conventions, but physical laws as well. In generating hypotheses about the nature of uniformities in the environment, it appears that some children form the rule "All  $X$  can be changed," which they then mistakenly apply to physical laws as well as conventions. This mistake occurs at all grade levels, though it is particularly remarkable at the first- and third-grade levels. These results might lead one to suspect that those children who overgeneralize are simply those who are biased to respond "yes" to any question or those children who, in their desire to please the experimenter, will blindly agree to any change. There is, however, evidence against such arguments. For instance, if it were true that those children who said rocks would float were merely agreeing to every change presented by the experimenter,

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one would expect these children to have a higher incidence of "perfect" scores than those children who do not overgeneralize. This is clearly not the case. No significant difference was found in the proportion of overgeneralizers versus the proportion of nonovergeneralizers who agreed to change every topic (18% vs. 13%,  $z = .190$ , N.S.). This is true even when one excludes the topic moral rules from the analysis and looks only at the four conventionality topics. Indeed, when one analyzes the data in this way, nonovergeneralizers are more likely to agree to a change in every convention than overgeneralizers, though not significantly so (30% vs. 25%).

Moreover, if the overgeneralization findings were simply the result of some children responding "yes" to everything, one would expect to find a particular response pattern. More specifically, one would expect the individual to have a perfect score on every item except for the topic physical law, where the child would fail every item, and the topic laws of the state, where in order to pass the second item, one must answer "no." Of the 28 children who overgeneralized, only one child showed this particular response pattern.

One might argue that the overgeneralization results are due to the fact that the children become progressively suggestible over trials. In other words, with each additional set of questions, the children become more and more willing to agree to changes, even bizarre ones. If this were true, one would expect a child questioned on the topic physical law on his last trial to be more willing to say rocks would float than a child who received this topic on his first trial. No significant relationship was found, however, between the percentage of children who agreed to a change in physical law and the trial on which they received this topic ( $z = .322$ , N.S.).

Finally, one might argue that children who overgeneralize are simply agreeing to change the word "sink" to "float." This seems unlikely for two reasons: (1) the children in each case were given a check question to ascertain whether they really believed the rock would "sink," that is, fall to the bottom, and (2) since the arbitrariness of the meaning of words was one of the most difficult topics for the children to understand, it seems unlikely they would make such a subtle interpretation of the question on their own accord.

The results of this study indicate that a child's understanding of conventionality develops as an organized whole. Moreover, it was found that across grades a child's score on the topic moral rules was positively related to his scores on the conventionality topics. This positive relationship suggests that a child's understanding of moral rules and of conventionality do not develop independently from one another. The issue is complicated, however, by the fact (a) that the children were significantly less willing to change moral rules than any of the four conventions studied (although by the fifth grade, 52% of the children did agree to the change); (b) that the results obviously rest upon our decision to score as mature those responses in which a change of moral rules is agreed to; and (c) that the intercorrelations between moral rules and conventions were not as strong as those among conventions.

Of the conventionality topics, children were most reluctant to change rules of etiquette and the meaning of words. Regarding the latter, Osherson and Markman (1975) have suggested that this difficulty stems from the inability of young children to look at language objectively; they tend instead to "look through" words to the events and objects to which words refer. From the results of this study, however, one might hypothesize that children do look at words objectively but are unable to understand their conventional nature. That is, children may realize that words exist and that their relationship to an object is different from the relationship of an object to its features, but they may still believe that the former relationship is a nonconventional one. The intercorrelations between the meaning of words topic and the other three conventionality topics supports this alternative hypothesis.

In summary, the results of this study support the following conclusions: (1) Children's ability to distinguish between social convention and physical law increases with age. (2) In learning to make this distinction, children pass through a stage in which they believe incorrectly that all regularities in the environment can be changed. (3) Children's understanding of conventionality develops as an organized whole. (4) As their understanding of social conventions develops, children tend to treat moral rules more like conventions than physical laws, although they are always more

reluctant to change moral rules than conventions. Finally, (5) children are more reluctant to change some conventions, such as the meaning of words, than other conventions.

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