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ABSTRACT

An investigation was made of the extent to which mental operations involved in quantitative conservation and pretense play affect the development of gender constancy. The research design included three phases: a pretest establishing subjects' levels of conservation and gender understanding, a training phase, and conservation and gender constancy posttests. Following pretests, nonconserving subjects were randomly assigned to one of three treatment conditions: (1) a conservation training condition stressing principles of identity and reversibility; (2) a pretense play training condition using inquiry procedures based on techniques described by Golomb, Goransen-Gowing, and Friedman (1982); and (3) a control condition which engaged subjects in drawing pictures. A total of 33 preschool children 4 or 5 years of age participated in the study. Overall, results supported the contention that similar cognitive operations underlie conservation of quantity, pretense play, and gender constancy. (RH)

The Role of Cognitive Operations in the Development of Gender Constancy

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The Role of Cognitive Operations in the Development of Gender Constancy

Studies of the concept of conservation have played a central role in the cognitive-developmental literature, perhaps as a result of the special status which Piaget has conferred on this concept. It is thus not surprising that conservation studies have outnumbered those conducted on other concrete operational concepts. Numerous training studies have been designed to discover effective techniques that induce the attainment of this concept, and presumably reveal the thought processes that lead to conservation in untrained and spontaneously conserving subjects.

The successful training studies on the one hand, and the documented instances of horizontal decalage which highlights apparent inconsistencies in the attainment of the same concepts on the other hand, have been interpreted as weakening Piaget's stage theory and perhaps invalidating his notion of unified cognitive structures that determine stage-specific reasoning strategies (Brainerd, 1978; Fischer, 1980; Flavell, 1982; Siegler, 1981). Another way of phrasing the controversy between supporters and critics of Piaget's position is to ask whether conceptual achievements are domain-specific or generalize across domains that utilize the same underlying thought processes. For example, conservation of number, length, area, substance, weight and volume all deal with quantitative problems and achievements, while conservation of self-identity and constancy of gender-identity represent qualitative forms of conservation achievement.

To the extent that similar reasoning processes might underlie the qualitative as well as the quantitative forms of conservation, we might expect some degree of congruence between conceptual achievements in both domains.

Since Kohlberg's (1966) early study of the development of gender understanding, a growing body of evidence suggests a developmental pattern that only gradually culminates in gender constancy (Eaton & Von Bergen, 1981; Kohlberg, 1966; Marcus & Overton, 1978; Slaby & Frey, 1975). This process has been described as consisting of four distinct phases: gender labeling, the consistent application of appropriate gender labels to self and others; stability, the child's awareness that gender remains stable over time; motive, the understanding that desire does not affect gender identity; gender constancy, the constancy of gender is maintained despite transformations of such sex-typed behaviors as clothing, hairstyle, and actions.

Although the course of the development of gender constancy seems to be well charted, research has not yet provided a systematic examination of the factors underlying this development. Kohlberg (1966) has suggested that the same cognitive factors which account for the development of conservation of quantity might also be involved in the development of gender constancy. The finding of significant correlations between gender constancy and quantitative conservation lends some support to the notion that gender constancy and conservation of quantity have a shared cognitive basis (De Vries, 1974; Kohlberg, 1966; Marcus & Overton, 1978). However, experimental evidence that would directly link gender constancy and quantitative conservation has not yet been provided, and the support for such linkage is mainly of a correlational nature.

Of the three processes identified by Piaget as underlying conservation, identity and reversibility seem to be the most likely candidates linking quantitative conservation to gender constancy. Although Piaget (1968) has stressed the differences between qualitative and quantitative identities, and attributed system properties only to the latter, there is some evidence that qualitative identity and reversibility are also organized into a total system. Golomb and her co-workers (Golomb & Cornelius, 1977; Golomb, Goranson-Gowing & Friedman, 1982) have provided evidence that the exercise of qualitative identity and reversibility in a pretense play setting can induce conservation of quantity in previously non-conserving children. Using a purely "qualitative" questioning method, they elicited conserving judgments and explanations, thus demonstrating the effectiveness of qualitative reversibility as measured by the improved quantitative conservation scores. These studies demonstrate a direct link between quantitative and qualitative domains, that is, between the reversibility that characterized quantitative conservation and the qualitative cognitive abilities that characterize pretense play.

The attainment of gender constancy appears to rest on the exercise of a qualitative type of identity that leads to the dissociation of the invariable aspects of gender from the variable ones, i.e., those usually associated with sex roles, for example, hair-length, dress, and role appropriate behavior. Gender constancy requires an understanding that the variable aspects can be undone, cancelled or reversed, and thus the thought operations that characterize gender constancy appear to be quite similar to those that define pretense play. If we follow this line of

reasoning one step further, and extend the already established link between pretense play training and conservation of quantity to pretense play and gender constancy, we might then hypothesize that the exercise of identity and reversibility in conservation or pretense play training will also affect gender constancy attainment. More specifically, we might predict that the exercise of qualitative identity and reversibility in pretense play will affect conservation achievement as well as gender constancy, and thus provide evidence that the three domains utilize similar cognitive processes.

The present study was designed to examine the extent to which the mental operations involved in quantitative conservation and pretense play also affect the development of gender constancy. With this goal in mind, nonconserving preschoolers were selected who also mostly failed the gender constancy test items. The effects of training in conservation and pretense play could then be assessed across one or two domains.

Methods

Subjects

The participants were 33 preschool children, 4 and 5 year olds, the offspring of middle-class college educated parents. They were enrolled in a nursery school in one of the suburbs of Greater Boston.

Experimental Design

The design included three phases: a pretest to establish the child's levels of conservation and gender understanding, a training phase, and two conservation and gender constancy posttests.

Following the pretests, subjects who failed to give a consistent conserving judgment were randomly assigned to one of three treatment conditions: (a) a conservation training condition in which the principles of identity and reversibility were stressed, (b) a pretense play training condition based on the training techniques employed by Golomb, Gowing & Friedman (1982) and (c) a control condition which engaged subjects in drawing pictures.

Tasks and Procedures

Conservation Pretest, Day 1. A solid and a liquid conservation task were presented to the child. First the examiner performed the transformation and then the child performed the same transformation. Following the transformation of the quantity the child was asked for his judgment and his justification of this judgment. Altogether, the subject was engaged in four trials.

Gender Pretests, Day 1. A series of questions designed to establish gender labeling, stability, motive and constancy were administered. Questions were formulated regarding the self, a same-sex-other, and an other-sex-other referent. A male and a female doll were used for questions regarding actual transformations of others.

Conservation Training, Days 5,6,7. Subjects met individually with the examiner on three consecutive days; each session lasted approximately 15 minutes. On each session the subject was provided with two conservation of quantity tasks, liquid quantity on the first two sessions, and playdough on the third. The first transformation was always performed by the experimenter, the second by the subject. The examiner provided judgments and justifications, questioned

the child about his judgments and corrected them when necessary. The justifications given by the examiner invoked identity and inversion rules.

Pretense Play Training, Days 5,6,7. Subjects were engaged individually in daily play sessions. Each child was encouraged to initiate a game, and during the course of the play sessions was questioned about the imaginary transformations. The inquiry procedures followed the techniques described by Golomb et al. (1982). Emphasis was placed on manoevering the child into explaining pretense play as involving reversible mental transformations and the maintenance of an enduring identity despite temporary and superficial transformations.

Control Group, Days 5,6,7. Members of the control group were engaged in art activities and provided with magic markers and white sheets of paper. A set of predetermined questions maintained a level of verbal interaction that was comparable to the two training groups.

Posttests, Days 8, 15. Subjects were tested on 6 conservation of quantity tasks, two of which were identical with the pretests. The procedures followed the guidelines established for the pretests and called for the child's judgment and justification. The gender constancy tasks were identical with those given on the pretest. Items and procedures for posttest 1 and 2 were identical.

Scoring Criteria

Conservation level scores were assigned acoording to the level of understanding demonstrated by the children's responses. Level 1 was assigned to subjects who gave at least one correct judgment on a given posttest. Level 2 was awarded for consistently correct judgments on all trials of a conservation posttest. Level 3 was

awarded for a perfect record of correct judgments and justifications.

Gender judgments were divided into the following levels: gender labeling, stability, motive and constancy. Level 1 was assigned if self-labeling was consistently demonstrated; level 2 indicated that identity was stable over time; level 3 was awarded if the motive questions which consider gender change in relation to desire were correctly answered; level 4 was assigned if constancy of gender was maintained despite transformations in hairstyle, dress and behavior.

Results

One-way ANOVAs were performed separately for each domain and each posttest and yielded statistically significant F ratios for change in conservation level for both posttests, and for change in gender level on posttest 1. Next a series of protected t tests (Fischer LSD) were performed for pairs of treatment groups. Pairwise comparisons on conservation achievement yielded statistically significant differences on posttest 1 and 2 for the two training conditions which exceeded the level attained by the Control Group (p's $< .001$ for conservation training; p's $< .05$ for pretense play training). The differences between the scores obtained on conservation training and pretense play training were also statistically significant ($p < .001$). These results replicate earlier findings that indicated the effectiveness of training across domains, i.e., from pretense play to conservation of quantity.

Pairwise comparisons for posttest 1 gender level scores yielded statistically significant effects for pretense play training which was more effective than the control condition ($p < .01$). The differences between conservation training and the control condition was in the predicted direction but failed to reach significance ($p < .10$).

For posttest 2, the differences between the training and the control conditions were in the predicted direction but failed to reach significance.

Discussion

The overall results support the contention that the qualitative and quantitative forms of identity and reversibility share common cognitive system properties, and that training in one domain can affect other related domains. In the case of pretense play training, the results indicate that it was effective across two domains, namely, conservation of quantity and gender constancy. Thus, our hypothesis was at least partially supported.

Next we address the question of "partial overlap", that is why the effects of training were not larger for gender and vanished on posttest 2. If we consider the small number of subjects (11 in each group) and the considerable within-subject variability, we can see that the training effects could easily be masked. However, we ought to consider differences as well as similarities of cognitive processes that underlie separate domains. In the gender constancy domain, for example, the stress on external-observable characteristics as the determinants of a gender judgment is an almost universally accepted practice, taught as a rule of thumb for the identification of males and females, and reinforced as a matter of course. Most adults in their contacts with unfamiliar persons tend to determine gender by dress, hairstyle, and behavior, and only if the evidence is contradictory do they go beyond the variable but conspicuous characteristics. Proof of sex and gender is not nearly as simple as that of conservation of quantity.

In summary, the results support, at least in part, the notion

that similar cognitive operations underlie conservation of quantity, pretense play and gender constancy.

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