

Spatial Configurations: Erikson Reexamined¹

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In a 1951 study, Erik Erikson reported differences in preadolescents' play constructions. He claimed that his findings reflected differences between males and females in their experience and perception of space. The present study replicated but also expanded the original design. In order to control for possible sex bias of materials, a constructed scene using only blocks was added to Erikson's original design. The results failed to replicate Erikson's findings. In fact, in the construction of scenes from blocks, more females than males built erected structures; this was true across all ages. These findings are in direct contrast to Erikson's results, and they lead to the conclusion that the materials provided, not innate anatomical sex differences, account for the resulting spatial configurations.

In a study published in 1951, Erik Erikson reported differences between the play scenes constructed by preadolescent males and those constructed by preadolescent females. He claimed that his findings reflected differences between the sexes in the perception, organization, and experience of space which, in turn, were rooted in genital morphology. Specifically, when given the chance to construct scenes, boys built tall erected structures and outdoor scenes which were highly mobile, while girls built quiet indoor scenes. From this Erikson (1951) concluded

... that the spatial tendencies governing these constructions closely parallel the morphology of the sex organs: in the male, *external* organs, *erectible* and *intrusive* in character, serving highly *mobile* sperm cells; *internal* organs in the female, with vestibular access, leading to statically *expectant* ova.

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These patterns, he claimed, reflected both sexual anatomy and biologically determined predispositions. In fact, the original data later provided the basis for a theory of inner space, which Erikson (1968) suggested was at the root of feminine psychology. Essentially, he argued for replacement of the Freudian basis of feminine psychology in genital trauma or penis envy with the concept of a reproductive inner space. Sexual differences were thus viewed not as primarily learned, but as biologically determined and, by implication, largely unchangeable.

Considering the plethora of theories that rest upon presumed sex differences, Maccoby and Jacklin (1974) noted the importance of having as "accurate and detailed knowledge as possible concerning the nature of existing differences and the differences these changes undergo at successive ages." Despite the widespread publicity and acceptance of Erikson's findings, only two published attempts to replicate his study could be found. Cramer and Hogan (1975) replicated and substantiated his findings, but their study was subject to the same confounding variables, discussed in the next paragraph, as was Erikson's original study. However, following a thorough critique of Erikson's methodology, Caplan (1979) modified the experimental design and failed to replicate the original findings with pre-school-aged children.

One major design question raised both by Caplan and this research was whether males and females select toys more stereotypically appropriate for their own sex. This was important because the types of toys selected and used by each sex directly affect the type of spatial configurations constructed from them. For instance, toy furniture cannot be used to build towers, while toy cars cannot be used to construct quiet indoor scenes. The nature of the toys necessarily affects what can be made from them and could confound findings. The current study required, as per Erikson's research, one play construction using both toys and blocks and, in order to control for possible sex bias in the play materials chosen, a second play construction using only blocks. The design was further extended to include a comparison among developmental stages, as suggested by Erikson's experiment.

Since Erikson asserted that his original findings reflected primarily innate perceptual differences between the sexes because of innate anatomical differences, such differences should be apparent both across ages and when using either a variety of toys or only blocks. Therefore, the current study was conducted using three different age groups—pre-adolescents, adolescents, and young adults—instead of only Erikson's pre-adolescent 11, 12, and 13 year olds.

SUBJECTS

Ninety subjects, 45 females and 45 males, volunteered to participate in the present study. Fifteen females and fifteen males were in each of three age groups: preadolescent (aged 11 years, 0 months to 12 years, 6 months), adolescents (aged 13 years, 6 months to 14 years, 8 months), and young adults (aged 18 years, 2 months to 19 years, 10 months). The preadolescents and adolescents came from a private school and the young adults came from a university. All subjects were from middle- to upper middle-class Caucasian families.

METHOD

The experimental room contained a 4 X 4-ft table on which play configurations were constructed. As in Erikson's study, materials included 100 blocks of varying sizes and shapes, 35 pieces of toy furniture, 12 dolls representing both family members and uniformed people, 10 toy cars, and 10 toy animals.

Demographic data were collected first and initial instructions were then read to each of the three groups as follows.

I'm interested in movies. I'd like to know what kind of movies students would make if they had a chance. I cannot, of course, provide a real movie studio, so you'll have to use these toys instead. Choose any of the things you see here and construct on this table an exciting scene out of an imaginary movie.

Upon completion of each construction, the scene as described by each student was tape recorded and a photograph was made of the construction before it was dismantled.

Next, the subject was asked to build a second "exciting" scene from an imaginary movie but was required to use only blocks. When the subject finished, the story description was tape recorded and a photograph was taken.

Data were collected on four variables, described below, relevant to Erikson's major theoretical arguments. Specifically, he concluded that spatial perception governing play constructions reflected sexual morphology, i.e., external and erectible genitalia in the male serving highly mobile sperm cells and internal genitalia in the female housing static ova. Therefore, play constructions for this experiment were examined for the following: number of erected structures (buildings and towers), height (tallest point in the construction), motion (frequency of channelized and

arrested movement), and number of enclosures (spaces enclosed by blocks). In addition to these four major variables, the frequency of interior, exterior, or combined interior/exterior settings in each scene was tabulated. Erikson's definitions were used in determining each category.

Data were obtained using ratings provided by two independent judges. Reliability was estimated on each of the variables separately. Interrater reliability was established at .94 to .99. Each judge rated 90 randomly selected experimental slides on each of the dependent variables. There was a total of 180 experimental slides, half using toys and blocks (Condition A) and half using only blocks (Condition B).

RESULTS

The present study was unable to replicate Erikson's original findings. Data were analyzed using univariate analyses of variance with repeated measures. Results of analyses for Condition A (toys and blocks) revealed no significant differences based on sex or age for any of the four dependent variables. The only variable which approached significance was motion, with males evidencing more motion in their constructions ($F = 3.00, p < .08$).

Results of analyses for Condition B (blocks only) again revealed no significant differences based on age or sex on three of the four dependent variables. In direct contrast to Erikson's findings, though, females, regardless of age, built significantly more erected structures than did males when given only blocks (female $X = 3.70$, male $X = 1.39$; $F = 6.67, p < .01$).

Analyses also revealed significant differences between Condition A and Condition B in the amount of motion and in the height and number of erected structures (see Table I). When given only blocks, all subjects, regardless of sex or age, built significantly taller configurations ($F = 34.74, p < .00$) and evidenced significantly more motion in their construction ($F = 10.81, p < .00$). While all subjects built significantly more erected structures in Condition B ($F = 7.34, p < .00$), females built significantly more erected structures than did males ($F = 5.15, p < .025$).

Next, possible sex and age differences in interior, exterior, or combined interior/exterior settings of scenes were examined using chi-square analyses. Results revealed no significant differences based on sex or age.

Finally, multivariate analyses of variance for the materials chosen showed a significant interactional effect for sex by age group. Subsequent univariate F tests showed that all males used significantly more toy cars ($F = 5.66, p < .02$), while females ($F = 4.17, p < .04$) and adults ($F = 5.73, p < .005$) used significantly more dolls in their constructions.

Table I. Results of Analyses of Variance with Repeated Measures

	Mean		Comparison of A to B		Probability (sign of F)
	Condition A	Condition B	F	F	
Structures					
Males	1.17	1.39		7.34	.0082 ^a
Females	1.19	3.70		.32	.7238
				5.15	.0259 ^a
				.31	.7350
Motion					
Males	.77	1.37		10.81	.0015 ^a
Females	.42	.95		.94	.3965
				.04	.8471
				1.96	.1476
Height					
Males	3.94	6.93		34.74	.0000 ^a
Females	3.74	7.40		.83	.4391
				.36	.5493
				.22	.8045
Enclosures					
Males	.33	.42		.57	.4517
Females	.44	.44		.57	.5658
				1.97	.1640
				.78	.4609

^aSignificant.

Given the slight tendency, although not significant, for males to use more motion in Condition A and the finding that all males used more toy cars, a Pearson product-moment correlation coefficient was then calculated between the number of cars and the amount of motion for sex and age groups. Results showed no significant differences based on age but did reveal a significant positive correlation between cars and motion for males ($r = .43, p < .05$). That is, when given a choice of toys, males chose more cars and constructed scenes involving more motion. When given only blocks, however, males no longer constructed scenes involving significantly more motion.

DISCUSSION

The findings of the present study contradicted Erikson's; no evidence was found for developmental differences among age groups.

The logical assumption of Erikson's theory of innate biological difference is that play configurations should reflect genital morphology, regardless of the toys used. However, when required to use blocks, females actually built significantly more erected structures than males. This dramatic reversal of Erikson's findings clearly cannot be explained by an anatomically based theory.

Furthermore, when sex-appropriate toy choices were unavailable, significant changes in the kinds of configurations were found. All subjects built more and taller erected structures and included more motion. When boys were given a choice, they selected the relatively more sex role-appropriate toy cars and produced more motion; when given only blocks, differences in motion disappeared. Such evidence strongly favors a theory of learning wherein males and females select learned sex-appropriate toys, which in turn predispose certain spatial configurations.

Further evaluation suggests that if Erikson's theory was correct, changes during the past several decades should not have significantly affected present results. Although social and sex-role expectations have undergone definite changes during the intervening decades, genital anatomy has not undergone any changes. Since anatomy has clearly been constant, differences in results between generations can be seen as a direct indictment of a theory resting upon biological determinism.

The current failure to replicate and, indeed, the actual reversals in expected trends leave Erikson's entire theory of inner space seriously in question. When the original design was modified to control for sex bias of materials, the results suggested that properties of the toys themselves influenced subsequent configurations. Thus, it appears probable that the

differences between Erikson's results and the current findings are a combination of social and sex-role changes since 1940 and methodological design problems which biased the original results. At the very least, Erikson's theory that spatial configurations parallel and reflect sexual anatomy is not substantiated by the current data.

In conclusion, the current data indicate that the types of toys selected, and not genital anatomy, largely determine the subsequent spatial constructions. Furthermore, analyses suggest that toys are not selected in order to facilitate sex-typed spatial configurations. Rather, sex-appropriate toys are the toys most often selected by each sex, and the properties of these toys encourage or preclude the construction of certain spatial configurations. Therefore, the results of the present study not only fail to substantiate Erikson's original findings but actually overturn his theory of inner space as a data-based phenomenon. Instead, the present data strongly suggest the influence of social learning and sex-appropriate behavior as the prime determinants in play configurations.

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