SUPPLEMENTAL MATERIALS

(1) Activities in each program

Table S1. Some of the activities that took place during each learning program.

'Bugs' program	'Plants' program
Story time with discussion (every day)	Story time with discussion (every day)
Scavenger hunt for insects	Scavenger hunt for seeds
Flower and bee hunt	Plant seeds
Scavenger hunt for ladybugs	Scavenger hunt for vegetables
Craft: insect exoskeleton t-shirt	Craft: decorate t-shirt with vegetable stamps
Song: "Head, thorax, abdomen"	Seed dissection
Butterfly lifecycle play	Seed lifecycle play
Craft: wings	Craft: bean shakers
Game of differences (Caterpillar vs. butterfly)	Plant peas
Craft: Bug eyes	Craft: Seed Mosaic

(2) Exploratory analyses: Within-domain differentiation for each program theme

Analyses of children's data

Although warranted by our study design, by analyzing the two camps together, the distance analyses reported in the manuscript do not examine whether the observed patterns of within-domain differentiation hold for each separate program theme (i.e., 'bugs' vs. 'plants'); here, we examine within-domain differentiation for each separate theme. Because we did not have a priori hypotheses about domain differences, and because analyzing each theme separately results in smaller sample sizes, we regard these analyses as exploratory. We tested the effects of phase (pre- vs. post-test), domain (experienced vs. not), pair type (in vs. out of category), and program theme (bugs vs. plants) on the distance between pairs of items (see Table S2 below); the main take-away is that the theme of the program did not significantly interact with any of the other predictors, nor was it a significant predictor of distance. As we may have been underpowered to detect an effect or interactions with program theme, we also conducted pairwise comparisons between the two pair types within each phase, domain, and program theme; the only marginally-significant difference between in- and out-of-category pairs was at post-test for pairs from the domain experienced for children in the 'bugs' program, $t(2687)=-1.94$, $p=0.05$ (all other t's < 1.51; all other p's > 0.132). Thus, the group-level within-domain differentiation patterns we observed may have been stronger in the 'bugs' relative to the 'plants' camp.

These results suggest that the two domains tested may not be equally differentiable. While multiple features differentiate insects from non-insects in the domain of 'bugs' and they are all external features, there is only one feature to differentiate between fruit and non-fruit plants (containing seeds), and this feature may be not as easily observed. The computational modeling studies discussed in the manuscript support this possibility as they suggest that the number of shared features (Hills et al, 2009) and the patterns of covariation among features (McClelland & Rogers, 2003) support increased differentiation. Thus, within-domain distinctions that rely on a larger number of shared features (i.e., insect vs. non-insect 'bugs') should be more differentiable relative to within-domain distinctions that rely on fewer shared features (i.e., fruit vs. non-fruit 'plants'), the pattern observed in these exploratory analyses. If the two domains become equally differentiable, we should find that adults differentiate within the two domains to the same extent; on the other hand, any differences in the extent to which adults differentiate within each domain would indicate that these two domains may not be equally differentiable. To examine whether the two domains tested become equally differentiable by adulthood, we asked adults to complete the same spatial arrangement task as the children enrolled in the enrichment learning program.

Methods and Analyses of Adults' Data

Participants. Twenty-five undergraduate students at Carnegie Mellon University participated in this study in exchange for course credit. The demographics of this sample were as follows: 14 females, 10 males, 1 not reported; 18 Asian/Pacific Islander, 3 Caucasian, 2 African-American, 1 multiracial, 1 not reported. Consent was obtained for all participants in compliance Carnegie Mellon University's Institutional Review Board.

Stimuli, Design, Procedure, and Data Coding. Participants completed the same spatial arrangement task as the children in the experiment reported in the manuscript. All design, procedure, and data coding details were identical to the main experiment, except that the adult participants were tested in a research laboratory on campus and completed the task only once. A subset of these participants also completed a second, unrelated task during their visit, to be reported elsewhere.

Within-domain differentiation. To examine the patterns of within domain differentiation across the two domains in adults, we tested the effects of pair type (in vs. out of category) and program theme (bugs vs. plants) on the distances between pairs of items belonging to the same domain. Both pair type (b=0.61, SE=0.09, $\chi^2(1)$=25.98, p<0.001) and theme (b=-0.01, SE=0.09, $\chi^2(1)$=21.63, p<0.001) were significant predictors of the distance at which adults placed items on the board. Furthermore, the two domains were not equally differentiable, as the interaction between pair type and theme was also a significant predictor of distance (b=-0.54, SE=0.13, $\chi^2(1)$=16.90, p<0.001). Pairwise contrasts showed that adults placed in category items significantly closer together to each other relative to out of category items in the domain of 'bugs' ($t(1622)$=-6.51, p<0.001) but not in the domain of 'plants' ($t(1622)$=-0.70, p=0.49).

Across-domain differentiation. To examine adults' patterns of across-domain differentiation, we also tested the effect of pair type (within vs. between domain) on the distances between pairs of items. As expected, adults placed pairs of items belonging to the same domain (i.e., two 'bugs' or two 'plants') closer together relative to pairs of items including one 'bug' and one 'plant', b=-4.12, SE=0.05, $\chi^2(1)$=6040.1, p<0.001.

General Discussion

The analyses of adults' distance scores suggest that – similar to the children's data – adults differentiate between the two domains, but only reliably differentiated items within the domain of 'bugs'. Together with the children's data, these analyses suggest that the two domains tested – 'bugs' and 'plants' – may not be equally differentiable even by adulthood. Although there are a number of alternative explanations for these results, and the small sample size and the post-hoc nature of these findings do not warrant strong conclusions, the fact that (1) analogous patterns were observed in a sample of children and adult participants and that (2) these findings can be predicted on the basis of prior computational work (Hills et al. 2009; McClelland & Rogers, 2003), lends some support to this interpretation. Because real-world domains of knowledge likely vary in the amount of differentiation they afford, the mechanistic framework for experience-driven changes suggested by prior computational modeling studies (Hills et al., 2009; Kemp & Tenenbaum, 2008; McClelland, & Rogers, 2003) can in principle predict the degree to which specific domains of knowledge (and specific items within those domains of knowledge) should become differentiated with experience. Future work can more directly test these possibilities.

Table S2. Children's data: Coefficient estimates, standard errors, Wald chisquare tests, and significance level for all predictors in the exploratory analysis examining within-domain differentiation for each program theme. Significant *p*-values are bolded.

Predictor	Coefficient	SE	χ^2	*p*-value
Phase (pre- vs. post-test)	-0.72	0.38	11.28	**0.0008**
Domain (experienced vs. not)	-0.22	0.33	1.28	0.257
Pair type (in vs. out of category)	-0.38	0.25	0.07	0.795
Program theme (bugs vs. plants)	-0.13	0.52	0.16	0.690
Phase * Domain	0.38	0.44	11.44	**0.0007**
Phase * Pair type	0.75	0.36	0.04	0.844
Domain * Pair type	0.87	0.36	2.50	0.114
Phase * Program theme	0.29	0.51	0.21	0.643
Domain * Program theme	0.17	0.44	0.01	0.912
Pair type * Program theme	0.17	0.34	0.68	0.410
Phase * Domain * Pair type	-1.33	0.51	5.06	**0.024**
Phase * Domain * Program theme	-0.55	0.59	0.60	0.437
Phase * Pair type * Program theme	-0.74	0.48	0.42	0.516
Domain * Pair type * Program theme	-0.41	0.48	0.11	0.744
Phase * Pair type * Pair type * Program theme	1.03	0.68	2.30	0.130