Appendix A: Results of Saliency Analyses

For each experiment, we conducted analyses on the most salient item as determined by each of the individual toolboxes. We provide the results of those analyses here to provide a comparison to the analyses provided in the text, of infants' responding to the item determined to be most salient by at least two toolboxes.

Experiment 1

Attention-getting. Infants' mean responses and the t-test compared to chance for the first fixation and first saccade directed to the most salient item in each array as determined by each toolbox is presented in Table A.1. In general, these analyses corroborate the results in the main text: 4-month-old infants, but not older infants, directed their first fixations to the most salient item.

Table A.1. Mean proportions of first fixations and first saccades to salient items according to several salience toolboxes; the top row in each section (labeled *converging*) refers to trials in which two or more toolboxes yielded the same most salient item in the array.

Experiment	Age (in months)	Toolbox	First fixation				First Saccade			
			M (*SD*)	*t*	*p*	*d*	*M* (*SD*)	*t*	*p*	*d*
1A	4	Converging	.30 (.27)	2.21	.040	.49	.25 (.23)	1.61	.124	.36
		GBVS	.25 (.13)	2.66	.015	.59	.22 (.10)	2.57	.019	.58
		IK	.22 (.13)	1.92	.070	.43	.16 (.10)	-0.12	.905	.03

		AIM	.21 (.13)	1.59	.129	.36	.18 (.17)	0.46	.653	.10
	6	Converging	.17 (.12)	0.21	.837	.05	.22 (.18)	1.04	.318	.27
		GBVS	.21 (.08)	2.18	.047	.56	.21 (.11)	1.63	.126	.42
		IK	.17 (.12)	-0.08	.939	.02	.18 (.13)	0.51	.621	.13
		AIM	.16 (.12)	0.08	.934	.02	.19 (.14)	0.53	.603	.14
	8	Converging	.14 (.14)	-0.77	.454	.19	.15 (.20)	-0.35	.734	.09
		GBVS	.16 (.13)	-0.30	.766	.08	.14 (.13)	-0.69	.501	.17
		IK	.16 (.09)	-0.48	.640	.12	.16 (.11)	-0.20	.844	.05
		AIM	.09 (.09)	-3.31	.005*	.83	.09 (.12)	-2.58	.021*	.65
1B	4	Converging	.30 (.18)	3.21	.005	.72	.31 (.27)	2.35	.030	.52
		GBVS	.27 (.14)	3.42	.003	.77	.27 (.18)	2.44	.025	.55
		IK	.22 (.11)	2.15	.045	.48	.22 (.17)	1.52	.145	.34
		AIM	.24 (.12)	2.54	.020	.57	.25 (.12)	2.15	.044	.48

* *note: these proportions are significantly lower than chance*

ANOVAs conducted evaluating developmental difference in the proportion of infants' first fixation and first saccade directed toward the most salient item confirmed the analyses reported in the text; there was a main effect of age for the analysis of infants' first fixations directed toward the items determined to be most salient by the AIM and the converging analysis. None of the ANOVAs on the proportion of first saccades showed main effects of Age, all *p*s > .09 (see Table A.2.).

Table A.2. *F* statistics, *p* values, and effect sizes from ANOVAs evaluating developmental difference in the proportion of infants' first fixation and first saccade directed toward the most salient item

Toolbox	First fixation			First Saccade		
	F	*p*	η^2_p	*F*	*p*	η^2_p
Converging	3.32	.044	.122	1.06	.355	.042
GBVS	2.51	.092	.095	2.44	.098	.092
IK	1.76	.182	.068	.19	.824	.008
AIM	5.17	.009	.177	2.38	.103	.090

Attention-holding. The analyses of the duration of infants' looking to the most salient item as determined by each toolbox also converged with the results reported in the main text (see Table A.3). In general, 4-month-old infants, but not older infants, looked longer than expected by chance to salient items.

Table A.3. Mean proportion of duration of looking to the most salient items and statistics

Experiment	Age (in months)	Toolbox	*M* (*SD*)	*t*	*p*	*d*
1A	4	Converging	.26 (.18)	2.26	0.036	0.50
		GBVS	.24 (.11)	2.93	0.009	0.65
		IK	.21 (.10)	1.89	0.074	0.42
		AIM	.17 (.09)	0.15	0.882	0.03
	6	Converging	.18 (.12)	0.36	0.722	0.09

		GBVS	.16 (.10)	-0.16	0.872	0.04
		IK	.14 (.09)	-0.92	0.375	0.24
		AIM	.15 (.10)	-0.56	0.582	0.15
	8	Converging	.13 (.09)	-1.71	0.108	0.43
		GBVS	.15 (.07)	-0.85	0.408	0.21
		IK	.16 (.09)	-0.34	0.738	0.09
		AIM	.10 (.03)	-9.51	<0.001*	2.38
1B	4	Converging	.22 (.12)	1.81	.086	.41
		GBVS	.22 (.09)	2.63	.017	.59
		IK	.18 (.07)	0.62	0.540	0.14
		AIM	.18 (.07)	1.21	0.243	0.27

* *note: these proportions are significantly lower than chance*

Two of the three ANOVAs evaluating age differences in duration of looking to the most salient item determined by each saliency toolbox also confirmed the main effect of age observed from the converging analysis (see Table A.4.).

Table A.4. *F* statistics, *p* values, and effect sizes from ANOVAs evaluating developmental difference in the proportion of duration of looking to the most salient item.

Toolbox	F	p	η^2_p
Converging	3.80	.029	.137
GBVS	4.51	.016	.158
IK	2.36	.105	.090
AIM	3.52	.038	.128

Experiment 2

Separate analyses for salience as determined by each toolbox for the samples in Experiments 2A and 2B generally corroborated the results reported in the main text. In Experiment 2A infants directed more of their first fixations and first saccades toward the most salient item (see Table A.5). In Experiment 2B, infants did not direct their first fixations or saccades to the most salient item.

Table A.5. Mean proportions of first fixations and first saccades to salient items and statistics

Experiment	Toolbox	First Fixation				First Saccade			
		M (SD)	*t*	*p*	*d*	*M (SD)*	*t*	*p*	*d*
2A	Converging	.59 (.15)	3.02	.006	.62	.62 (.18)	3.22	.004	.66
	GBVS	.57 (.15)	2.26	.033	.46	.57 (.18)	2.02	.055	.41
	IK	.58 (.16)	2.34	.029	.48	.61 (.23)	2.34	.029	.48
	AIM	.55 (.15)	1.75	.093	.36	.57 (.21)	1.65	.113	.34
2B	Converging	.52 (.20)	0.51	.618	.11	.53 (.26)	0.48	.636	.11
	GBVS	.54 (.17)	1.01	.330	.23	.54 (.31)	0.51	.617	.11
	IK	.45 (.20)	-1.13	.27	.25	.48 (.19)	-0.38	.707	.09

	AIM	.53 (.20)	0.77	.452	.17	.55 (.21)	1.08	.295	.24

The results of how long infants looked at the most salient item according to each toolbox also yielded essentially the same results as those reported in the main text. In both experiments, infants tended to look equally at the two items.

Table A.6. Mean proportions of duration of looking to salient items

Experiment	Toolbox	*M* (*SD*)	*t*	*p*	*d*
	Converging	.53 (.14)	1.25	.224	0.25
2A	GBVS	.53 (.12)	1.03	.313	0.21
	IK	.51 (.11)	0.38	.711	0.08
	AIM	.54 (.13)	1.36	.187	0.28
2B	Converging	.46 (.15)	-1.11	.282	0.25
	GBVS	.57 (.13)	2.28	.034	0.51
	IK	.45 (.16)	-1.37	.186	0.31
	AIM	.55 (.18)	1.36	.189	0.30

Appendix B: Feature Analysis

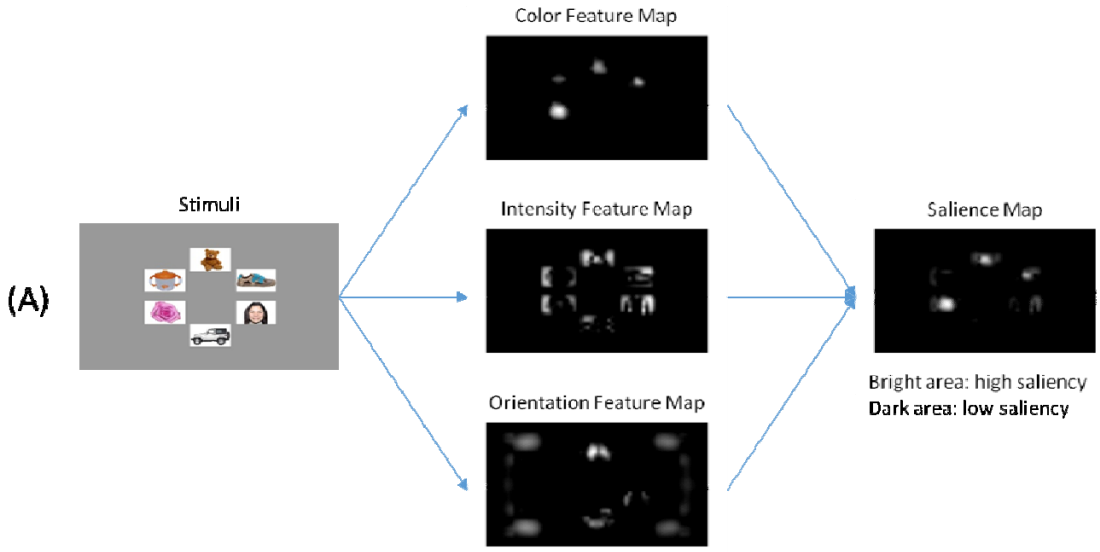
In addition to evaluating the saliency of the items in our arrays using standard toolboxes, we determined how particular features contributed to the salience of our stimulus items by extracting feature maps from the Saliency (IK) toolbox (Walther & Koch, 2006), and we evaluated the salience of each item with respect to those feature maps.

We generated feature maps for color, intensity, and orientation by computing local contrasts in each feature dimension. These feature maps were then combined into a single *salience* map (see Figure B.1 panel A). Next, we simplified by computing the average saliency value across the pixels within an AOI. Then, the salience values for the six locations were normalized so that the sum of salience values in a single display was set to 1, and the salience values for each item ranged from 0 to 1 (see Figure B.1 panel B).

To determine which object *category* was the most salient, the saliency values for each item in that category were averaged across stimulus arrays. This revealed that the flower had the highest average saliency and the face had the lowest average saliency in the arrays (see Figure B.2). Note that the average saliency of the shoe was also very low in our 6-item arrays. Moreover, analyses of the frequency which each item was the most salient item in the array confirmed our other analyses; the flower was most frequently the most salient item in the array and the face was rarely the most salient item in the 6-item arrays.

Finally, we used the results of this process to examine which feature dimension(s) contributed to the total saliency values of our stimuli, and whether the same feature

dimension(s) contributed to the salience across a category of items. We carried out Pearson's correlation analyses between combined salience and the salience of each feature dimension for each item type in each stimulus array (see Figure B.3). The pattern of correlations indicates that color and intensity, but not orientation, contributed to the total saliency values of the pictures in all 6 categories. This tendency was the same across all arrays presented to infants at each age and in each experiment.



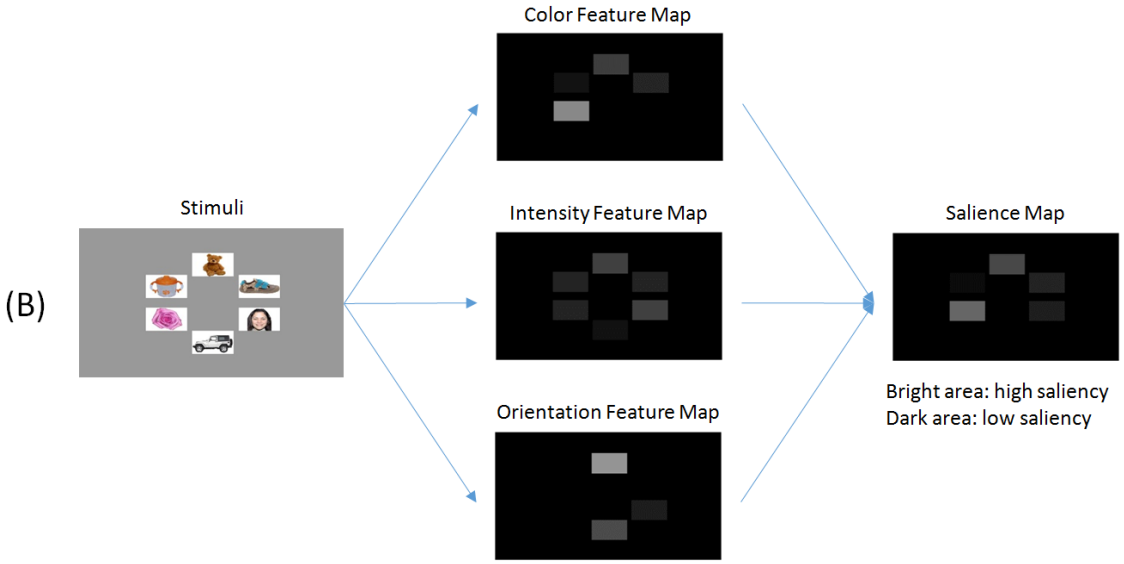
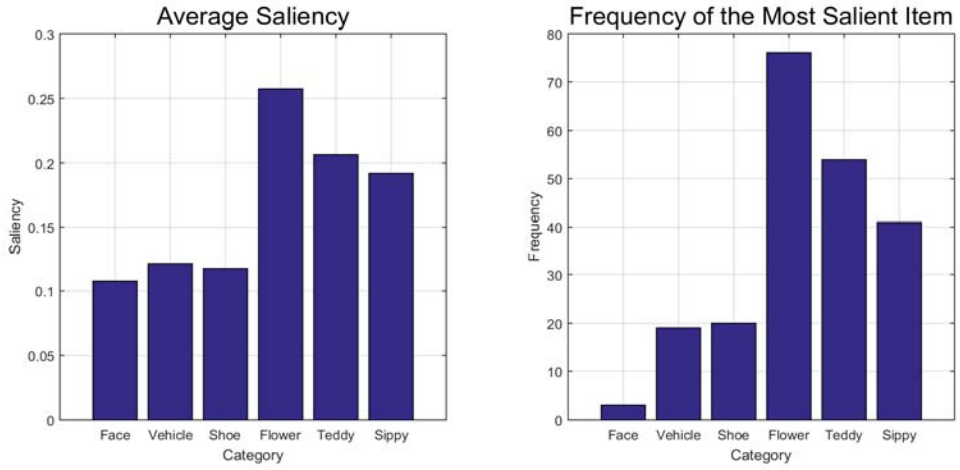
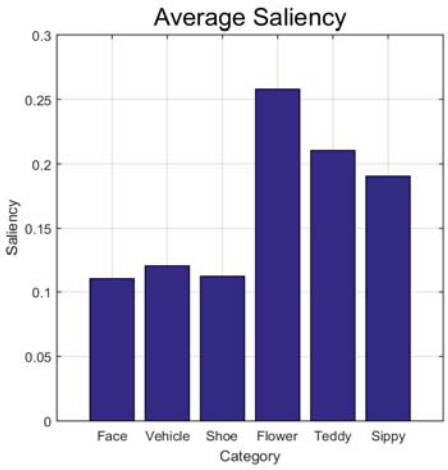


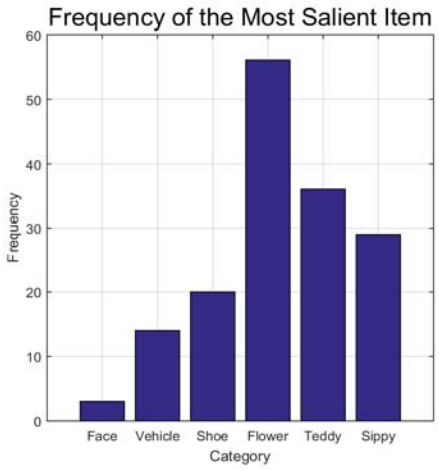
Figure B.1. An illustration of how we computed saliency values from the three feature maps and combined salience map. See text for a description. The face image was obtained from the NimStim Face Stimulus Set (Tottenham et al., 2009) and the individual whose face appears here gave signed consent for her likeness to be published in scientific journals.

Experiment 1A: 4-month-olds

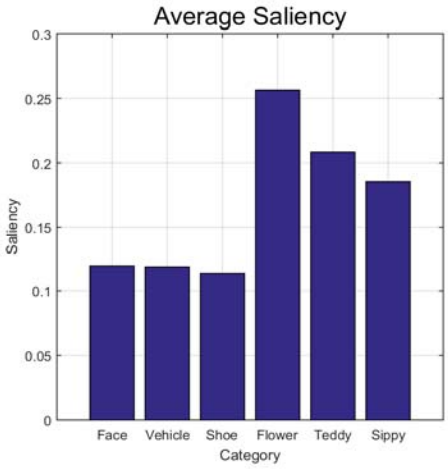


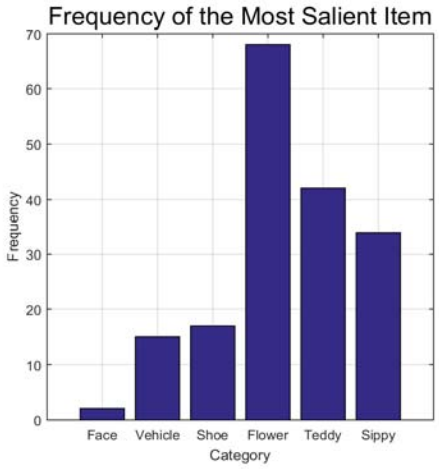
Experiment 1A: 6-month-olds



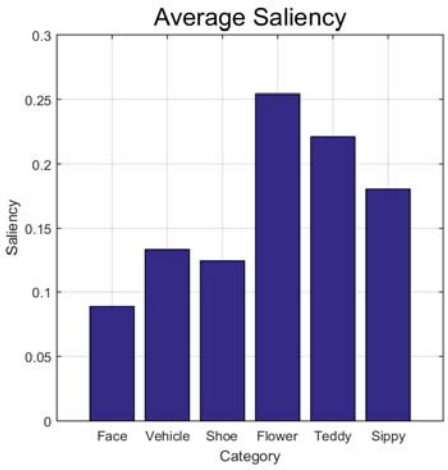


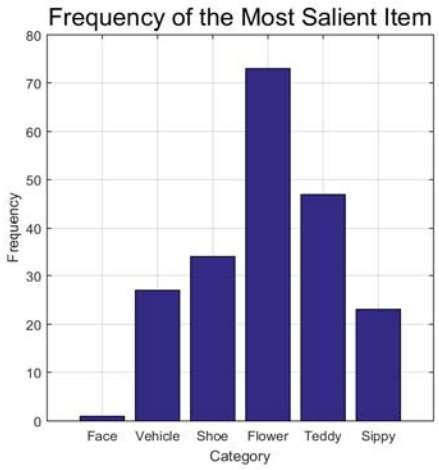
Experiment 1A: 8-month-olds



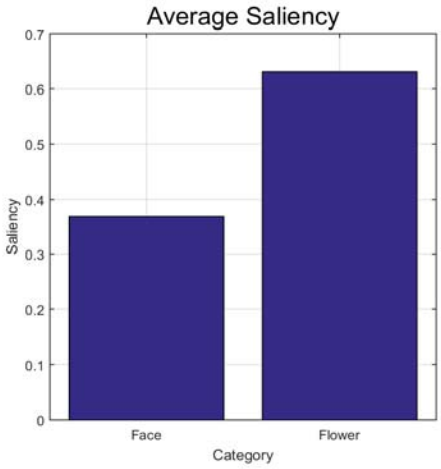


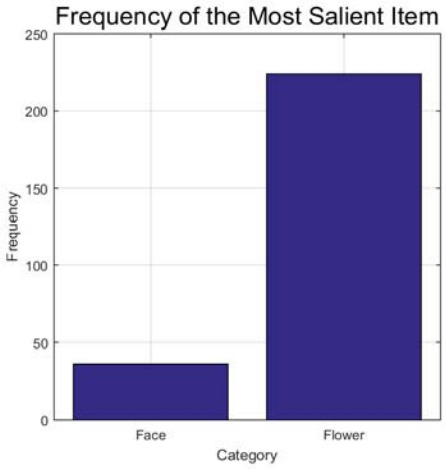
Experiment 1B: 4-month-olds





Experiment 2A: 4-month-olds





Experiment 2B: 4-month-olds

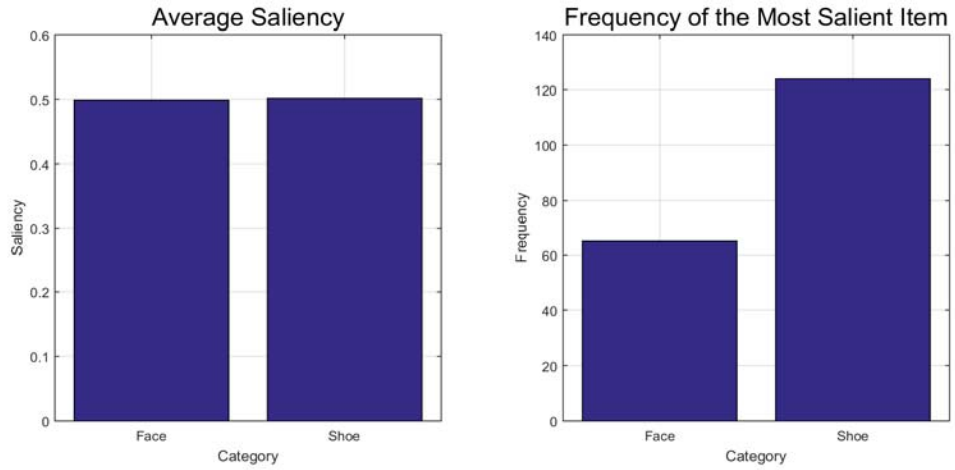
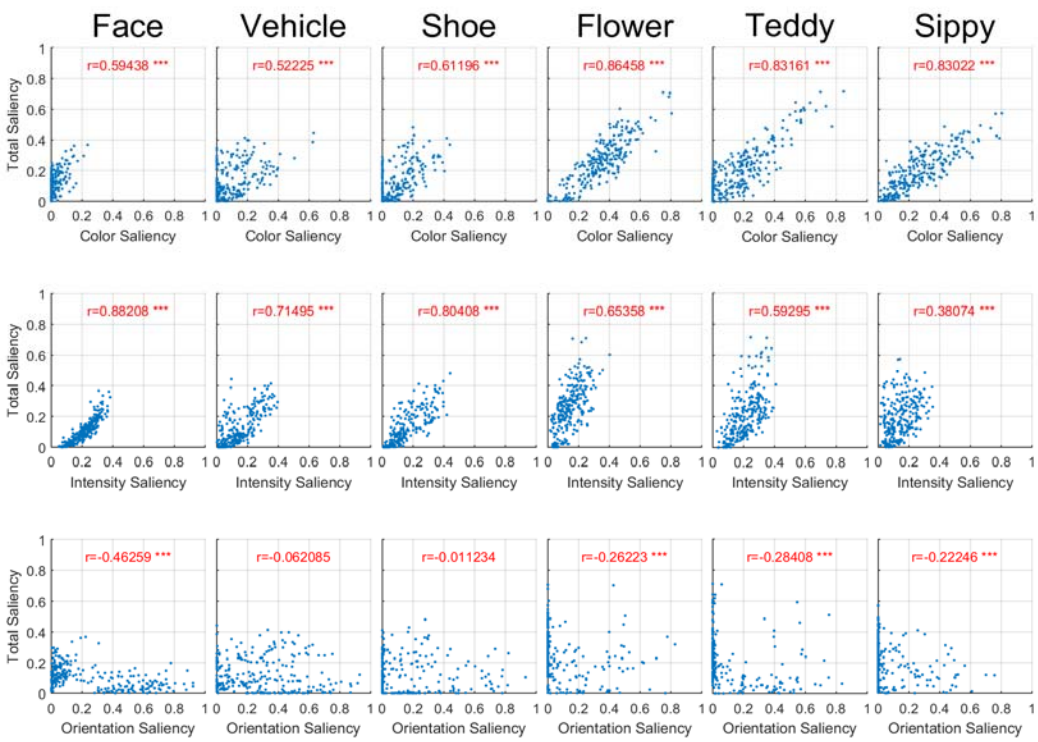
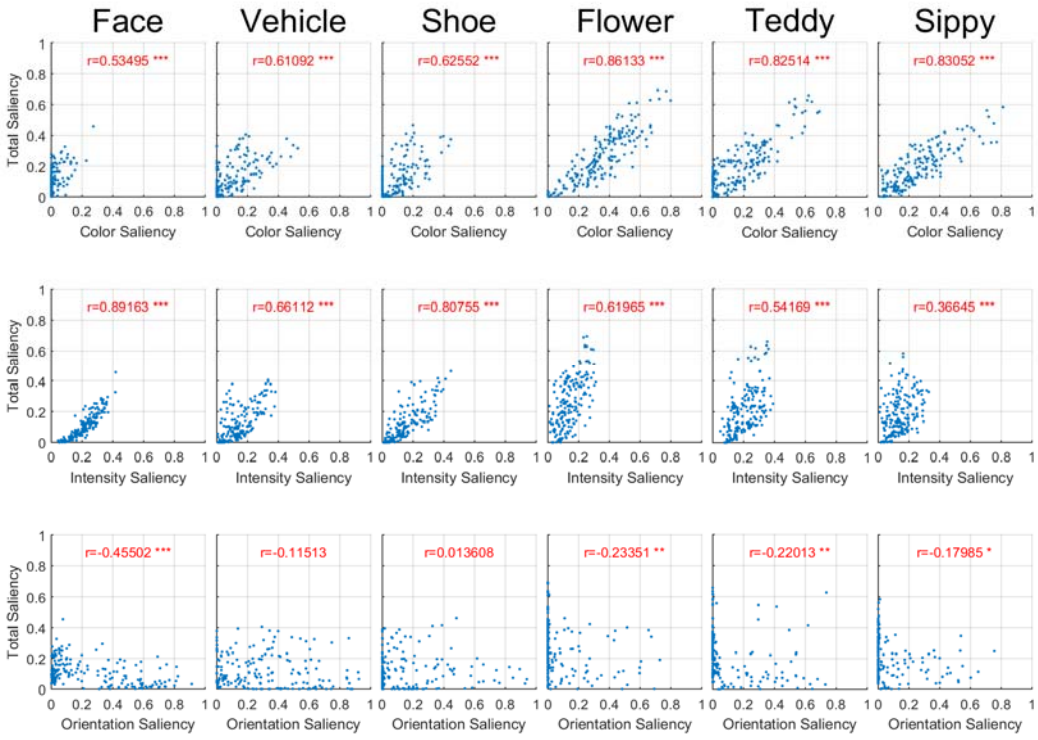


Figure B.2. Average saliency value (on the left) and frequency of the most salient item (on the right) by category, age and experiment.

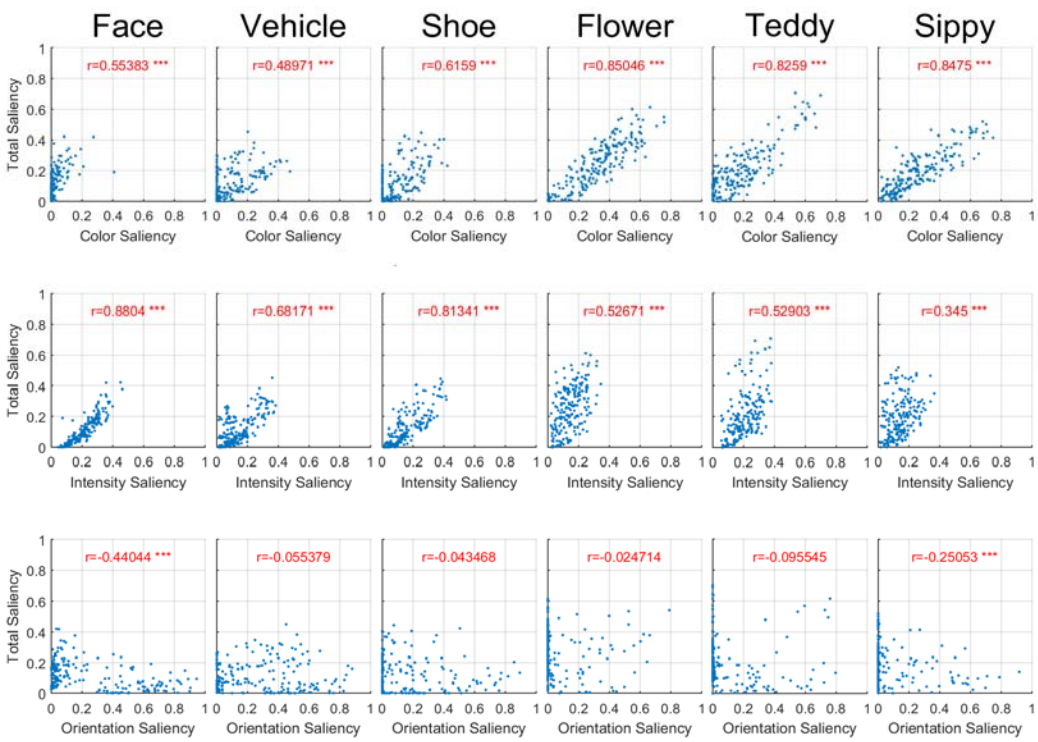
Experiment 1A: 4-month-old infants



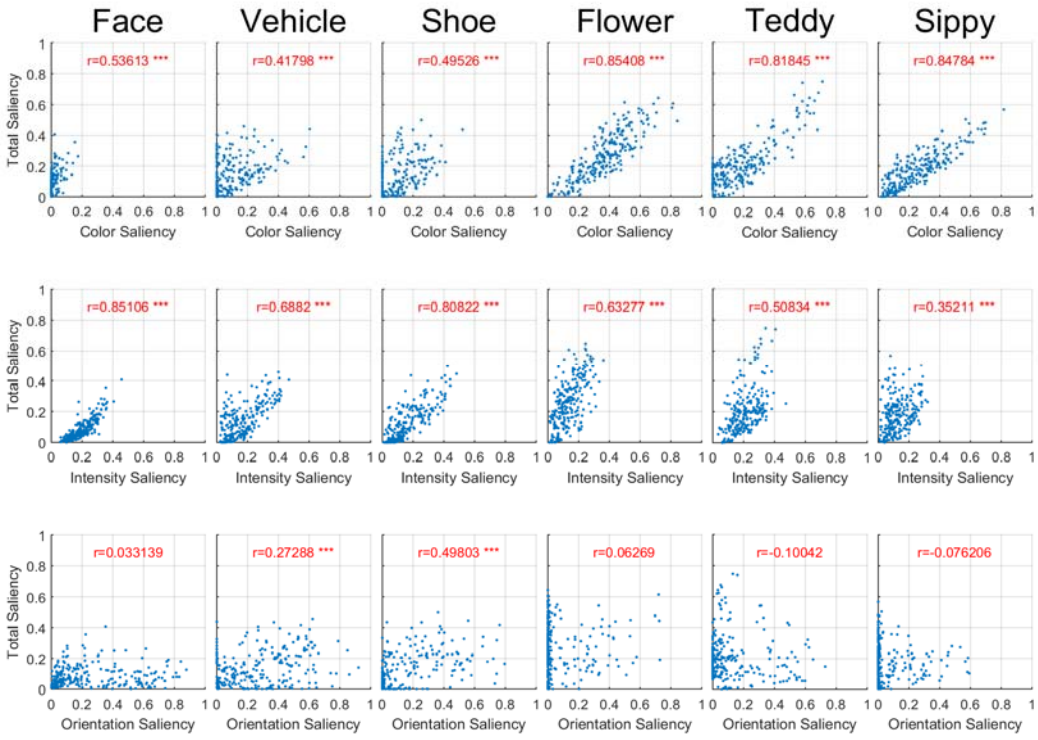
Experiment 1A: 6-month-old infants



Experiment 1A: 8-month-old infants



Experiment 1B: 4-month-old infants



Experiments 2A (on the left) and 2B (on the right)

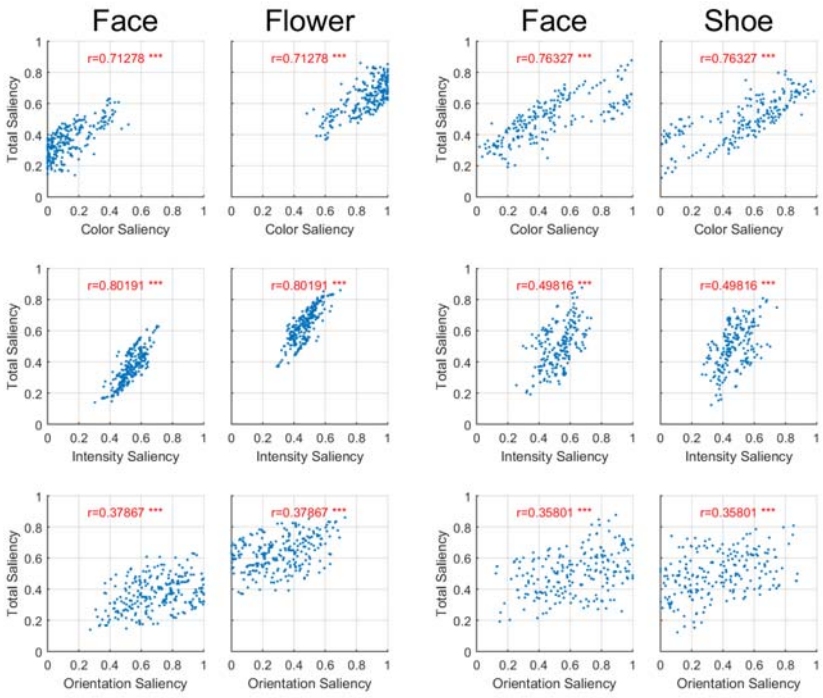


Figure B.3. Correlations between each feature saliency and total saliency. * p <.05, ** p <.01, *** p <.001.