

Supplemental Material  
 Learning From Video: A Meta-Analysis of the Video Deficit in Children Ages 0 to 6 Years  
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Supplemental Table 1

*Moderators Included in Analyses*

Author(s)	Year	Location	Source	Design	Domain	Video
Barr & Hayne	1999	other	PR	BT	imitation	pre
Barr, Muentener, & Garcia	2007	US/Canada	PR	BT	imitation	pre
Barr, Muentener, et al.	2007	US/Canada	PR	BT	imitation	pre
Barr, Shuck, et al.	2010	US/Canada	PR	BT	imitation	pre
Barr & Wyss	2008	US/Canada	PR	BT	imitation	pre
Barr, Wyss, & Somanader	2009	US/Canada	PR	BT	imitation	pre
Bates, Ricciardelli, & Clarke	1999	other	PR	BT	other	pre
Broekman	2013	other	other	BT	language	pre
Carroll-Rowan & Miltenberger	1994	US/Canada	PR	BT	other	pre
Crawley-Davis	2002	US/Canada	other	BT	object retrieval	live
DeLoache et al.	2010	US/Canada	PR	BT	language	pre
Deocampo	2004	US/Canada	other	BT	imitation	live
Deocampo & Hudson	2005	US/Canada	PR	WI	object retrieval	live
Dickerson	2012	US/Canada	other	BT	imitation	pre
Dickerson, Gerhardstein, et al.	2013	US/Canada	PR	BT	imitation	pre
DiYanni, Nini, & Rheel	2011	US/Canada	PR	BT	imitation	pre
Gonsiorowski	2014	US/Canada	other	BT	imitation	pre
Hayne, Herbert, & Simcock	2003	other	PR	BT	imitation	pre
Howard et al.	2015	US/Canada	PR	BT	imitation	pre
Huang & Charman	2005	other	PR	BT	imitation	pre
Kerkman et al.	1996	US/Canada	PR	WI	other	pre
Kirkorian et al.	2016	US/Canada	PR	BT	object retrieval	live
Klein, Hauf, & Aschersleben	2006	other	PR	BT	imitation	pre
Koppa	2014	US/Canada	other	BT	language	live
Krcmar	2010	US/Canada	PR	WI	language	pre
Krcmar	2011	US/Canada	PR	WI	language	pre
Krcmar, Grela, & Lin	2007	US/Canada	PR	WI	language	pre
Krieger et al.	2016	other	PR	BT	imitation	pre

Kuhl, Tsao, & Lin	2003	US/Canada	PR	BT	language	pre
Labine	2010	US/Canada	other	WI	imitation	pre
Lauricella, Barr, & Calvert	2016	US/Canada	PR	BT	imitation	pre
Lauricella, Howard, & Calvert	2010	US/Canada	other	BT	imitation	pre
Lauricella, Pempek, et al.	2010	US/Canada	PR	BT	object retrieval	pre
Lenninger et al.	2019	other	other	WI	object retrieval	live
McGuigan et al.	2007	other	PR	BT	imitation	pre
Moriguchi & Hiraki	2014	other	PR	WI	other	pre
Moser et al.	2015	US/Canada	PR	BT	imitation	pre
Nielsen, Simcock, & Jenkins	2008	other	PR	BT	imitation	pre
O'Doherty	2013	US/Canada	other	BT	imitation	pre
O'Doherty, Troseth, et al.	2011	US/Canada	PR	BT	language	pre
Reiß et al.	2017	other	PR	BT	other	pre
Roberts & Blades	1999	other	PR	WI	other	pre
Robinson	2011	US/Canada	other	BT	language	pre
Roseberry, Hirsh-Pasek, & Golinkoff	2014	US/Canada	PR	BT	language	live
Sage & Baldwin	2015	US/Canada	PR	BT	imitation	pre
Schmidt, Crawley-Davis, & Anderson	2007	US/Canada	PR	BT	object retrieval	live
Schmitt & Anderson	2002	US/Canada	PR	BT	object retrieval	pre
Sheffield & Hudson	2006	US/Canada	PR	BT	imitation	pre
Sims	2013	US/Canada	other	BT	language	pre
Smith & Lillard	2013	US/Canada	other	BT	imitation	pre
Strouse & Troseth	2008	US/Canada	PR	BT	imitation	pre
Thierry & Spence	2004	US/Canada	PR	BT	other	pre
Troseth & DeLoache	1998	US/Canada	PR	BT	object retrieval	live
Troseth, Saylor, & Archer	2006	US/Canada	PR	BT	object retrieval	live
Troseth, Strouse, et al.	2018	US/Canada	other	BT	language	live & pre
Tsuji & Cristia	2019	other	other	BT	language	pre
Tsuji, Fievet, & Cristia	2019	other	other	BT	language	live
Zelazo, Sommerville, & Nichols	1999	US/Canada	PR	WI	object retrieval	pre
Zimmerman et al.	2015	US/Canada	PR	BT	imitation	pre

PR = peer-reviewed; BT = between-subjects; WI = within-subjects (repeated measures); pre = pre-recorded

Supplemental Table 2

*Effect Size Estimates*

Author(s)	Year	Subgroup	Age (mo)	<i>g</i>	Std. Error	Learning Outcome Coded
Barr & Hayne	1999	exp 1a	12.29	-1.221	0.432	imitation score
		exp 1a	15.22	-1.151	0.428	
		exp 1a	18.26	-0.725	0.408	
		exp 1b	12.3	-2.025	0.491	
		exp 1b	15.23	-0.956	0.418	
		exp 2	15.22	-0.437	0.399	
		exp 3	15.25	-0.901	0.415	
		exp 3	18.3	-1.721	0.466	
Barr, Muentener, & Garcia	2007	exp 1	12.48	0.000	0.394	imitation score
		exp 1	15.26	-0.691	0.407	
		exp 1	18.45	-0.553	0.402	
		exp 3	6.58	0.000	0.394	
Barr, Muentener, et al.	2007	exp 1a	15.33	0.000	0.394	imitation score
		exp 1a	18.64	-0.190	0.395	
		exp 1a & 1b	21.36	-0.857	0.413	
		exp 1c	12.58	0.099	0.394	
Barr, Shuck, et al.	2010	exp 1, demo + test	6.5	-0.238	0.396	imitation score
		exp 1, demo + test	12.5	-0.307	0.397	
		exp 1, demo + test	18.5	-0.737	0.408	
		exp 1, demo only	6.5	-0.998	0.420	
		exp 1, demo only	12.5	-0.393	0.398	
		exp 1, demo only	18.5	-0.773	0.410	
Barr & Wyss	2008		24.47	-0.602	0.404	imitation score
Barr, Wyss, & Somanader	2009		6.59	0.155	0.388	imitation score
			12.61	0.279	0.396	
			18.54	0.228	0.377	
Bates, Ricciardelli, & Clarke	1999		69.6	-0.557	0.414	proportion of recall questions correct

Broekman	2013		51.5	0.000	0.209	# of character names recalled
Carroll-Rowan & Miltenberger	1994		60	-0.593	0.300	initial in situ abduction assmnt. score
Crawley-Davis	2002		23.88	-0.241	0.346	proportion of errorless retrievals
DeLoache et al.	2010		14.7	-1.307	0.409	proportion of words identified at posttest
Deocampo	2004		23.57	-1.042	0.439	tool test score (choice of correct tool)
			30.05	-1.323	0.447	
Deocampo & Hudson	2005	exp 1	24.03	-1.065	0.250	proportion errorless retrievals
Dickerson	2012		24.55	-0.617	0.448	imitation score (gestures)
Dickerson, Gerhardstein, et al.	2013		18.13	-0.372	0.398	imitation score (goals)
			24.11	-0.751	0.372	
			30.08	-0.887	0.407	
			36.2	-0.311	0.397	
			42.08	-0.314	0.397	
DiYanni, Nini, & Rheel	2011		66	1.162	0.477	# children using non-affordant tool
			78.1	0.099	0.439	
Gonsiorowski	2014		37.1	-0.139	0.310	difference score, imitation - baseline
Hayne, Herbert, & Simcock	2003	exp 1a live,	24	-1.099	0.462	imitation score
		exp 1b video/same				
		exp 1a video,	24	-1.809	0.515	
		exp 1b live/different				
		exp 1a	30	-1.538	0.493	
		exp 2	24	-2.722	0.607	
		exp 2	30	-1.245	0.471	
Howard et al.	2015		19.4	-0.138	0.326	imitation score (English)
			38.6	1.184	0.355	imitation score (English + Spanish)
Huang & Charman	2005	exp 1	17.1	-0.888	0.451	mean target actions produced in 20s (overall)
Kerkman et al.	1996	live first	66	0.356	0.166	# children succeeding at balance scale problem
		video first	66	-1.012	0.515	
Kirkorian et al.	2016		24.2	-0.632	0.339	avg. # trials with errorless retrievals
Klein, Hauf, & Aschersleben	2006	returning	12	-0.565	0.363	imitation score

		shaking	12	-0.719	0.367	
Koppa	2014		33.45	0.182	0.327	proportion correct immediate forced choice target identification trials
Krcmar	2010		9.5	-0.071	0.261	proportion correct word learning trials
			16.5	-0.671	0.284	
			22.5	-0.204	0.278	
Krcmar	2011		13.27	-0.509	0.136	looking time to target object
Krcmar, Grela, & Lin	2007		20.47	-0.283	0.148	proportion of children correct on word learning test
Krieger et al.	2016		53	0.380	0.287	number of completed steps imitated
Kuhl, Tsao, & Lin	2003		9.3	-1.394	0.441	percent correct performance on phonetic contrast head-turn
Labine	2010		11.1	0.139	0.173	problem solving score
Lauricella, Barr, & Calvert	2016	audience gaze	15	-0.220	0.395	imitation score (rattle)
		audience gaze	18	-0.296	0.396	
		object gaze	15	0.071	0.380	
		object gaze	18	-0.212	0.388	
Lauricella, Howard, & Calvert	2010		21.37	0.405	0.348	seriation score
Lauricella, Pempek, et al.	2010		30.48	-1.250	0.433	adjusted object retrieval scores
			36.11	-0.668	0.406	
Lenninger et al.	2019		24	-0.582	0.260	# of correct retrievals
McGuigan et al.	2007	clear	43	-1.055	0.508	proportion of tool insertions (irrelevant/total)
		clear	65	-0.357	0.477	
		opaque	43	-2.629	0.663	
		opaque	65	-0.866	0.497	
Moriguchi & Hiraki	2014		72.7	0.045	0.269	correct responses on card sort
Moser et al.	2015		30.6	-3.751	0.602	imitation score (goal)
			36.7	-3.093	0.537	
Nielsen, Simcock, & Jenkins	2008		24.52	-0.924	0.416	# boxes switch touched with object
O'Doherty	2013		37	-0.847	0.410	# of children, exact imitation, one-speaker, Russian
			60.1	0.653	0.438	

O'Doherty, Troseth, et al.	2011	study 1, addressed study 1, onlooker	29.65 29.8	-0.139 0.000	0.388 0.392	# of children, correct target chosen
Reiß et al.	2017		55	0.064	0.349	# of children, correct theory of mind test question
			65	-0.638	0.349	
Roberts & Blades	1999	exp 1	54	-0.315	0.251	# of accurate direct question responses
		exp 2	54	-0.172	0.246	# of accurate free recall details
Robinson	2011		33.32	-0.377	0.383	first visit forced choice score (word learning)
Roseberry, Hirsh-Pasek, & Golinkoff	2014		26.52	-0.314	0.397	percent looking to matching action
Sage & Baldwin	2015	exp 1	48.17	-0.926	0.344	overall production of target actions
Schmidt, Crawley-Davis, & Anderson	2007	exp 1	24.5	-2.356	0.440	percent errorless retrievals
		exp 2	24.5	-1.417	0.388	
Schmitt & Anderson	2002	exp 1	24.38	-2.520	0.536	percent errorless retrievals
		exp 1	30.27	-1.606	0.457	
		exp 1	36.33	-0.311	0.397	
		exp 2	24.39	-1.273	0.435	
Sheffield & Hudson	2006	exp 1	18	-0.615	0.439	cued productions of target actions
Sims	2013	study 1a	33.4	-0.042	0.439	forced choice generalization
		study 1b	33.8	0.171	0.374	
Smith & Lillard	2013		54.2	-0.034	0.345	imitation score
Strouse & Troseth	2008	study 1	24.2	0.000	0.380	imitation score
		study 2	24.3	-1.069	0.408	
		study 3	24.6	-0.850	0.398	
Thierry & Spence	2004	exp 1	52.8	-0.003	0.301	percent correct, actions & objects recalled
		exp 1	68.26	0.459	0.304	
		exp 2	53.4	-0.473	0.372	# correct central actions & objects recalled
Troseth & DeLoache	1998		24.54	-2.033	0.543	# errorless retrievals
Troseth, Saylor, & Archer	2006		24.2	-1.514	0.451	percent errorless retrievals

Troseth, Strouse, et al.	2018	responsive	24.5	-0.283	0.298	word learning score
		responsive	30.5	-0.355	0.299	
		unresponsive	24.5	0.156	0.297	
		unresponsive	30.5	-0.572	0.302	
Tsuji & Cristia	2019		11.28	0.111	0.247	proportion of time looking at target
Tsuji, Fievet, & Cristia	2019		16.56	-0.342	0.249	proportion of time looking at target
Zelazo, Sommerville, & Nichols	1999		38.3	0.081	0.245	# of errorless retrievals
			49	0.242	0.248	
Zimmerman et al.	2015	context	24.52	-0.638	0.383	goal imitation proportion
		context	30.52	-0.283	0.375	
		no context	24.52	-0.024	0.351	
		no context	30.52	-0.975	0.404	

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Supplemental Table 3

*Coding of Live Video Studies*

Author(s)	Year	Groups Compared	Feed	Domain	<i>g</i>
Crawley-Davis	2002	live vs. visual tv	1-way	object retrieval	-0.241
Deocampo	2004	24 mo: window tool vs. video tool	1-way	imitation	-1.042
		30 mo: window tool vs. video tool	1-way	imitation	-1.323
Deocampo & Hudson	2005	window vs. video imitation (study 1)	1-way	object retrieval	-1.065
Kirkorian et al.	2016	live vs. video	1-way	object retrieval	-0.632
Koppa	2014	live vs. skype	bi	language	0.182
Lenninger et al.	2019	base vs. stream	1-way	object retrieval	-0.582
Roseberry, Hirsh-Pasek, & Golinkoff	2014	live vs. contingent video	bi	language	-0.314
Schmidt, Crawley-Davis, & Anderson	2007	exp. 1 live vs. video	1-way	object retrieval	-2.356
		exp. 2 live vs. video	1-way	object retrieval	-1.417
Troseth & DeLoache	1998	exp. 1 vs. exp. 2	1-way	object retrieval	-2.033
Troseth, Saylor, & Archer	2006	direct vs. video	1-way	object retrieval	-1.514
Troseth, Strouse, et al.	2018	24 mo: responsive live vs. responsive video	bi	language	-0.283
		30 mo: responsive live vs. responsive video	bi	language	-0.355
Tsuji, Fievet, & Cristia	2019	live vs. video chat	bi*	language	-0.342

*Note.* Feeds were coded as bidirectional if the researcher received real-time information about the behavior of the viewing child. Bidirectional feeds were more likely in recent studies and were present exclusively in language learning studies.

\* This study was coded as bidirectional because the researcher received real-time information about where the child was looking.



Supplemental Table 4

*Effect sizes for Subgroups Reported in Moderator Analyses*

Group	$\bar{g}$	Confidence Interval
Overall	-0.53	[-0.66, -0.41]
Age <sup>a</sup>		
Below 36 months	-0.63	[-0.77, -0.50]
36 months and above	-0.25	[-0.50, -0.01]
Video type		
Pre-recorded video	-0.49	[-0.62, -0.36]
Live video	-0.82	[-1.17, -0.48]
Learning domain <sup>b</sup>		
Imitation	-0.58	[-0.76, -0.41]
Language learning	-0.27	[-0.41, -0.14]
Object retrieval	-1.00	[-1.40, -0.60]
Other	-0.16	[-0.40, 0.08]

<sup>a</sup> Age groups significantly differed from one another

<sup>b</sup> Object retrieval significantly differed from all other learning domains. There were no other pairwise differences.

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