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Can children use similarity between actions to learn grammar?

Anning, F.

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The Plymouth Student Scientist
University of Plymouth

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Appendix

Appendix A – A copy of the generic instructions used by all researchers

Similarity-in-grammar study generic instructions

1. MAKE SURE PARENT HAS READ AND SIGNED INFO / CONSENT FORM

2. PRACTISE

Say “*You will see two films on the computer screen. It’s a special computer screen which you are allowed to touch. You will hear a lady talking about **ONE** of the films. So you need to **listen carefully to what the lady says** and then **touch the film the lady is talking about. But don’t point until AFTER the film stops!**”*

[If child does not point, say “**which film was the lady talking about? Touch it!**”

3. TRAINING

Say “*Now we’re going to hear the lady talking in an alien language. Listen to how she talks about what we’re going to see*”.

4. TEST

Say ““Do you remember how I asked you to watch two films and point to the one the lady was talking about? Now we’re going to do the same thing again.”

- Ask PARENT to keep their eyes closed during this part.
- YOU need to watch the child’s face and not the screen until AFTER the child has pointed.

“So you’ll see two films again on the computer, and you’ll hear the lady talking about one of the films. Just touch the film the lady is talking about like you did before. *But don’t point until AFTER the film stop!*”

[If child does not point, say “**which film was the lady talking about? Touch it!** “.

5. TRANSLATION POST-TEST

Say “You’ve heard the sentences in an alien language, now I want to know what you think they mean in our language. **Look at** [puppet doing action or appearing]. **What is it doing?**” If the child does not reply or gives an ambiguous response, say “**What do you think of when you look at** [puppet doing action or appearing]?”

If the child says ‘moopo’ or similar, say “**Yes, that’s what it is called in the alien language. But how would you daddy or nanny talk about it?**”

6. GIVE DE-BRIEF FORM AND MONEY FOR TRAVEL COSTS AND GET PARENT TO SIGN FOR THIS.

Appendix B – A copy of the information sheet about the study and consent form sent to parents

UNIVERSITY OF PLYMOUTH

School of Psychology

Information Sheet and Consent Form

CONSENT TO PARTICIPATE IN RESEARCH PROJECT

Fiona Anning & Dr. Kirsten Abbot-Smith, University of Plymouth
Name of Principal Investigator(s)

Do children use similarity between actions to learn grammar?

Staff research project and Undergraduate Project

What are we interested in?

Eventually children can understand new sentences which they have never heard. Do they use similarity between actions to do this? This study looks at whether children use similarity between the meanings of verbs (or ‘action words’ such as ‘push’ and ‘kick’) in order to transfer what they have learned about a particular aspect of grammar to a verb

which they have never heard. In order for us to be sure what the children have and have not previously learned, we will let 5-7-year-old children hear an 'alien' language. This is an extension of a previous study carried out by researchers in the USA and Canada (Casenhiser & Goldberg, 2005, *Developmental Science*).

What are we going to do?

Before we start, the researcher will play informally with your child as a warm-up exercise. You are more than welcome to join in the play at this point. Then your child will be asked to sit next to the researcher facing a computer screen. You can sit behind your child and watch during the practise and training trials, but we would ask you not to name any of the toy animals or actions from this point on, as it could influence your child's responses.

First your child will be shown 6 'practise' video clips. For each, your child will see two simultaneous film clips on the screen and will hear a pre-recorded sentence (e.g. they hear '*the monster is rolling on the ball*' and they see a monster lying on a ball and rolling around on the left-hand clip and simultaneously a monster rolling a ball on the right hand clip. This phase is to help your child understand that pointing is required and that the correct answer is sometimes on the right hand side and sometimes on the left hand side of the screen.

Then your child will see the 'training' phase in which they will see films of puppets carrying out unusual actions and they will hear these actions described with a made-up words (such as 'toopa'). Some of the actions will share a certain similarity of meaning. Some of these made-up words will be heard in sentences which have the word order of English (e.g. 'the pig toopas onto the ramp') and some will be heard in sentences which have a funny order. This set of films will take about 10 minutes. After they have finished we will show the children 12 pairs of film clips side-by-side and ask them to point to which of the two clips they think the funny word order refers. In this last test phase we will ask you to close your eyes so as not to accidentally influence where your child points. (You will, however, be free to see these 12 clips afterwards, if you wish).

Finally, your child will be asked what they thought the made-up words meant. (This is help us see whether our test is really measuring the aspect of sentence meaning which we want it to measure).

The entire session should take no longer than 30 minutes and will be video-recorded to allow the researcher to later code which pictures your child pointed to.

You are free at any time point to withdraw from this study, should you wish. If you wish to do so, either tell the experimenter or please contact Dr. Kirsten Abbot-Smith on Kirsten.abbot-smith@plymouth.ac.uk or call (01752) 584804.

1. YOUR CHILD'S DATE OF BIRTH:

2. Has your child ever had a hearing or other developmental impairment which might affect language development? YES/NO (Please circle which) IF YES, PLEASE STATE WHICH: _____

3.. Has your child ever been diagnosed as having a language delay? YES/NO (Please circle which).

PLEASE TICK AS APPROPRIATE, AND SIGN & DATE THE FORM

- The objectives of this research have been explained to me.
- I understand that I am free to withdraw from the research at any stage, and can ask for my data to be destroyed if I wish.
- I understand that my anonymity is guaranteed, unless I expressly state otherwise.
- I understand that the Principal Investigator of this work will have attempted, as far as possible, to avoid any risks, and that safety and health risks will have been separately assessed by appropriate authorities (e.g. under COSHH regulation).
- I understand that a video recording of my child will be made. This recording will be used for scoring purposes, will be seen by the experimenters only, will be stored on a safe place on the University premises, and destroyed within 5 years after publication of the results.
- Under these circumstances, I agree (for my child.....) to participate in the research.

Name:

Signature:
.....

Date:

Faculty of Science Human Research Ethics Committee List of School Representatives

Centre for Theoretical and Computational Neuroscience (Chair)	Professor Chris Harris
School of Psychology	Professor Simon Handley Dr Paul Broks Dr Matt Roser
School of Earth, Ocean and Environmental Sciences	Mr Matthew Barlow
School of Biological Sciences	Dr David J. Price
External Representative	Dr Oonagh Corrigan
Lay Member	Social Science and Business Rev. David Evans

Committee Secretary: Mrs Paula Simson

email: paula.simson@plymouth.ac.uk

tel: 01752 232984

Appendix C – A list of all the appearance training sentences (SOV) and their meanings

- The parrot the table moopo(s/ed) = the parrot appears out of thin air onto the table
- The duck the chair moopo(s/ed) = the duck appears out of thin air onto the chair
- The bear the book moopo(s/ed) = the bear appears out of thin air onto the book
- The fish the hat moopo(s/ed) = the fish appears out of thin air onto the hat
- The dog the box vako(s/ed) = the dog climbs out of the box
- The rabbit the blanket keebo(s/ed) = the rabbit wriggles out of the blanket
- The flower the grass koufo(s/ed) = the flower grows out of the grass
- The balloon the sky faygo(s/ed) = the balloon appears from behind a cloud in the sky

Appendix D – A list of all the causative training sentences (SVO) and their meanings

- The lion meek(s/ed) the bear = the lion spins the bear around on the novel apparatus
- The penguin meek(s/ed) the elephant = the penguin spins the elephant around on the novel apparatus
- The queen meek(s/ed) the frog = the queen spins the frog around on the novel apparatus
- The pig meek(s/ed) the dog = the pig spins the dog around on the novel apparatus
- The king fapp(s/ed) the ball = the king bowls the ball
- The spider tam(s/ed) the box = the spider picks up the box
- The dog weef(s/ed) the owl = the dog rocks the owl on the second novel apparatus
- The prince choop(s/ed) the balloon = the prince bursts the balloon

Appendix E – A list of all the pairs of test sentences and their meanings

- Appearance – The princess the box shannos = the princess pops out the box
Causative – The princess shanns the box = the princess catapults the box off of a seesaw
- Appearance – The king the window kofos = the king appears at the window from behind the curtains
Causative – The king kofs the window = the king scrubs the window
- Appearance – The monkey the wall veemos = the monkey peers around the wall
Causative – The monkey veems the wall = the monkey pushes the wall over backwards
- Appearance – The horse the bowl pookos = the horse falls into the bowl from off a ledge
Causative – The horse pooks the bowl = the horse flips the bowl over
- Appearance – The car the cow zoopos = the car appears from behind a cow on a hill
Causative – The car zoops the cow = the car drags the cow up the hill
- Appearance – The shark the sea neebos = the shark jumps out of the sea
Causative – The shark neebos the sea = the shark tips the cup and pours something into the sea which changes its colour

Appendix F – A copy of the debrief given to parents

UNIVERSITY OF PLYMOUTH

School of Psychology

De-brief

Fiona Anning & Dr. Kirsten Abbot-Smith, University of Plymouth
Names of Principal Investigators

Do children use similarity between actions to learn grammar?

In this study we looked at whether children can use similarity between the meanings of verbs in order to transfer what they have learned about a particular aspect of grammar to a verb which they have never heard. To do so, we adapted a method and procedure previously used by American and Canadian colleagues to see whether children can

learn to associate a novel word order (SUBJECT-OBJECT-VERB) with a general meaning of ‘thing or person appearing in a location’, AND whether they are able to generalise this meaning-word order pairing to untested novel verbs. Furthermore, in a second condition we examined whether children are still able to do this when this new meaning-word order pairing is not the only meaning children see and hear during training. In addition in a post-test we examined how the children actually interpreted these made-up verbs, and whether performance in the generalisation test is correlated with target-like interpretations of the verbs.

In our written article we will report only group results comparing these two conditions. Your child’s data will remain anonymous. However, you are of course free to withdraw your child’s data from our study at any time. If you would like a copy of the final written report and / or would like to contact the principal investigator for further questions, please contact Dr. Kirsten Abbot-Smith on Kirsten.abbot-smith@plymouth.ac.uk or call (01752) 584804.

Appendix G – The SPSS output tables of the descriptive statistics for the practice trials

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Prac_rep	20	4.0	6.0	5.450	.6863
Valid N (listwise)	20				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Prac_addr	20	4.0	6.0	5.475	.6584
Valid N (listwise)	20				

Appendix H – The SPSS output table of the descriptive statistics for the forced – choice comprehension test

Descriptive Statistics

Condition		Mean	Std. Deviation	N
SOV_pcent	Replication condition	.3545	.34607	20
	Additional transitive condition	.2600	.24348	20
	Total	.3072	.29920	40
SVO_pcent	Replication condition	.7215	.29914	20
	Additional transitive condition	.7420	.23761	20
	Total	.7318	.26685	40

Appendix I – The SPSS output tables for the mixed design ANOVA conducted on the forced – choice comprehension test data

Tests of Between-Subjects Effects

Measure:MEASURE_1

Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	21.590	1	21.590	253.463	.000
Condition	.027	1	.027	.321	.574
Error	3.237	38	.085		

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
wordorder	Sphericity Assumed	3.604	1	3.604	46.615	.000
	Greenhouse-Geisser	3.604	1.000	3.604	46.615	.000
	Huynh-Feldt	3.604	1.000	3.604	46.615	.000
	Lower-bound	3.604	1.000	3.604	46.615	.000
wordorder * Condition	Sphericity Assumed	.066	1	.066	.855	.361
	Greenhouse-Geisser	.066	1.000	.066	.855	.361
	Huynh-Feldt	.066	1.000	.066	.855	.361
	Lower-bound	.066	1.000	.066	.855	.361
Error(wordorder)	Sphericity Assumed	2.938	38	.077		
	Greenhouse-Geisser	2.938	38.000	.077		
	Huynh-Feldt	2.938	38.000	.077		
	Lower-bound	2.938	38.000	.077		

Appendix J – The SPSS output table for the ANCOVA's conducted on the forced – choice comprehension test data

Tests of Within-Subjects Effects

Measure:MEASUR
E_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
wordorder	Sphericity Assumed	.002	1	.002	.028	.867
	Greenhouse- Geisser	.002	1.000	.002	.028	.867
	Huynh-Feldt	.002	1.000	.002	.028	.867
	Lower-bound	.002	1.000	.002	.028	.867
wordorder * Exp_code	Sphericity Assumed	.090	1	.090	1.127	.296
	Greenhouse- Geisser	.090	1.000	.090	1.127	.296
	Huynh-Feldt	.090	1.000	.090	1.127	.296
	Lower-bound	.090	1.000	.090	1.127	.296
wordorder * Coder_code	Sphericity Assumed	.003	1	.003	.042	.838
	Greenhouse- Geisser	.003	1.000	.003	.042	.838
	Huynh-Feldt	.003	1.000	.003	.042	.838
	Lower-bound	.003	1.000	.003	.042	.838
wordorder * Gender	Sphericity Assumed	.143	1	.143	1.787	.191
	Greenhouse- Geisser	.143	1.000	.143	1.787	.191
	Huynh-Feldt	.143	1.000	.143	1.787	.191
	Lower-bound	.143	1.000	.143	1.787	.191
wordorder * Months	Sphericity Assumed	.031	1	.031	.388	.538
	Greenhouse- Geisser	.031	1.000	.031	.388	.538
	Huynh-Feldt	.031	1.000	.031	.388	.538
	Lower-bound	.031	1.000	.031	.388	.538

wordorder * Prac	Sphericity Assumed	.014	1	.014	.177	.677
	Greenhouse-Geisser	.014	1.000	.014	.177	.677
	Huynh-Feldt	.014	1.000	.014	.177	.677
	Lower-bound	.014	1.000	.014	.177	.677
wordorder * Condition	Sphericity Assumed	.060	1	.060	.756	.391
	Greenhouse-Geisser	.060	1.000	.060	.756	.391
	Huynh-Feldt	.060	1.000	.060	.756	.391
	Lower-bound	.060	1.000	.060	.756	.391
Error(wordorder)	Sphericity Assumed	2.560	32	.080		
	Greenhouse-Geisser	2.560	32.000	.080		
	Huynh-Feldt	2.560	32.000	.080		
	Lower-bound	2.560	32.000	.080		

Appendix K – The SPSS output table for the test of normality conducted on the forced – choice comprehension test data

Tests of Normality

Condition		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
SOV_pcent	Replication condition	.197	20	.040	.865	20	.010
	Additional transitive condition	.207	20	.024	.865	20	.010
SVO_pcent	Replication condition	.274	20	.000	.809	20	.001
	Additional transitive condition	.211	20	.020	.854	20	.006

a. Lilliefors Significance Correction

Appendix L – The SPSS output table for the one – sample t – tests conducted on the forced – choice comprehension test data

One-Sample Test

	Test Value = 0.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
SOV_percent	-4.074	39	.000	-.19275	-.2884	-.0971
SVO_percent	5.493	39	.000	.23175	.1464	.3171

Appendix M – The SPSS output table of the descriptive statistics for each individual verb from the forced choice comprehension test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
shanno	16	.156	.3010	.0753
lemmo	23	.239	.4229	.0882
veemo	16	.469	.4990	.1247
pooko	24	.250	.4170	.0851
zoopo	31	.290	.4238	.0761
neebo	16	.656	.4366	.1092
shann	24	.896	.2941	.0600
lem	17	.912	.1965	.0477
veem	22	.591	.5032	.1073
pook	15	.933	.2582	.0667
zoop	10	.900	.3162	.1000
neeb	23	.283	.4479	.0934

**Appendix N – The SPSS output table for the one – sample t – tests
conducted on all the individual verbs from the forced – choice comprehension
test**

One-Sample Test

	Test Value = 0.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
shanno	-4.568	15	.000	-.3438	-.504	-.183
lemmo	-2.958	22	.007	-.2609	-.444	-.078
veemo	-.251	15	.806	-.0312	-.297	.235
pooko	-2.937	23	.007	-.2500	-.426	-.074
zoopo	-2.755	30	.010	-.2097	-.365	-.054
neebo	1.431	15	.173	.1562	-.076	.389
shann	6.593	23	.000	.3958	.272	.520
lem	8.641	16	.000	.4118	.311	.513
veem	.847	21	.406	.0909	-.132	.314
pook	6.500	14	.000	.4333	.290	.576
zoop	4.000	9	.003	.4000	.174	.626
neeb	-2.328	22	.030	-.2174	-.411	-.024

Appendix O – The SPSS output table for the descriptive statistics of the translation post –test responses

Descriptive Statistics

Condition		Mean	Std. Deviation	N
SOV_test	replication condition	.2895	.20669	19
	additional transitive condition	.3750	.27506	20
	Total	.3333	.24483	39
SOV_trainin g	replication condition	.2303	.18287	19
	additional transitive condition	.3813	.22018	20
	Total	.3077	.21430	39
SVO_test	replication condition	.7895	.12225	19
	additional transitive condition	.7833	.12212	20
	Total	.7863	.12060	39

Appendix P – The SPSS output tables for the ANOVA conducted on the translation post – test responses

Tests of Between-Subjects Effects

Measure:MEASURE_1

Transformed Variable:Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	26.358	1	26.358	531.361	.000
Condition	.172	1	.172	3.475	.070
Error	1.835	37	.050		

Tests of Within-Subjects Effects

Measure: MEASU
RE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
sentencetype	Sphericity Assumed	5.690	2	2.845	86.055	.000
	Greenhouse-Geisser	5.690	1.882	3.024	86.055	.000
	Huynh-Feldt	5.690	2.000	2.845	86.055	.000
	Lower-bound	5.690	1.000	5.690	86.055	.000
sentencetype * Condition	Sphericity Assumed	.121	2	.061	1.836	.167
	Greenhouse-Geisser	.121	1.882	.065	1.836	.169
	Huynh-Feldt	.121	2.000	.061	1.836	.167
	Lower-bound	.121	1.000	.121	1.836	.184
Error(sentencetype)	Sphericity Assumed	2.447	74	.033		
	Greenhouse-Geisser	2.447	69.617	.035		
	Huynh-Feldt	2.447	74.000	.033		
	Lower-bound	2.447	37.000	.066		

**Appendix Q – The SPSS output table for the LSD post – hoc analysis
conducted on the translation post – test responses**

Pairwise Comparisons

Measure:MEASURE_1

(I) sentencetype	(J) sentencetype	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference ^a	
					Lower Bound	Upper Bound
SOV_test	SOV_training	.026	.045	.555	-.064	.117
	SVO_test	-.454*	.043	.000	-.541	-.368
SOV_training	SOV_test	-.026	.045	.555	-.117	.064
	SVO_test	-.481*	.036	.000	-.553	-.408
SVO_test	SOV_test	.454*	.043	.000	.368	.541
	SOV_training	.481*	.036	.000	.408	.553

Based on estimated marginal means

a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

*. The mean difference is significant at the .05 level.

Appendix R – The SPSS output table for the test of normality conducted on the translation post – test responses

Tests of Normality

Condition		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
SOV_test	replication condition	.163	19	.200*	.908	19	.069
	additional transitive condition	.260	20	.001	.870	20	.012
SOV_trainin g	replication condition	.247	19	.004	.874	19	.017
	additional transitive condition	.161	20	.183	.927	20	.134
SVO_test	replication condition	.324	19	.000	.834	19	.004
	additional transitive condition	.309	20	.000	.842	20	.004

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Appendix S – The SPSS output table for the one – sample t – tests conducted on the translation post – test responses

One-Sample Test

	Test Value = 0.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
SOV_test	-4.251	38	.000	-.16667	-.2460	-.0873
SOV_trainin g	-5.604	38	.000	-.19231	-.2618	-.1228
SVO_test	14.826	38	.000	.28632	.2472	.3254

Appendix T – The SPSS output table of the descriptive statistics for each individual verb from the translation post - test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
shanno	39	.69	.468	.075
neebo	39	.10	.307	.049
veemo	39	.13	.339	.054
pooko	39	.59	.498	.080
lemmo	39	.23	.706	.113
zoopo	39	.26	.442	.071
moopo_parrot	39	.05	.223	.036
moopo_duck	39	.10	.307	.049
moopo_bear	39	.05	.223	.036
moopo_fish	39	.10	.307	.049
vako	39	.51	.506	.081
keebo	39	.51	.506	.081
koufo	39	.33	.478	.076
faygo	39	.79	.409	.066
pook	39	1.00	.000 ^a	.000
veem	39	.85	.366	.059
shann	39	.82	.389	.062
neeb	39	.13	.339	.054
lem	39	.97	.160	.026
zoop	39	.95	.223	.036

a. t cannot be computed because the standard deviation is 0.

Appendix U – The SPSS output table for the one – sample t – tests conducted on all the individual verbs from the translation post – test responses

One-Sample Test

	Test Value = 0.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
shanno	2.569	38	.014	.192	.04	.34
neebo	-8.075	38	.000	-.397	-.50	-.30
veemo	-6.855	38	.000	-.372	-.48	-.26
pooko	1.125	38	.268	.090	-.07	.25
lemmo	-2.383	38	.022	-.269	-.50	-.04
zoopo	-3.439	38	.001	-.244	-.39	-.10
moopo_parrot	-12.540	38	.000	-.449	-.52	-.38
moopo_duck	-8.075	38	.000	-.397	-.50	-.30
moopo_bear	-12.540	38	.000	-.449	-.52	-.38
moopo_fish	-8.075	38	.000	-.397	-.50	-.30
vako	.158	38	.875	.013	-.15	.18
keebo	.158	38	.875	.013	-.15	.18
koufo	-2.179	38	.036	-.167	-.32	-.01
faygo	4.502	38	.000	.295	.16	.43
veem	5.914	38	.000	.346	.23	.46
shann	5.148	38	.000	.321	.19	.45
neeb	-6.855	38	.000	-.372	-.48	-.26
lem	18.500	38	.000	.474	.42	.53
zoop	12.540	38	.000	.449	.38	.52