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Appendix A: Animal symbols available, used and rejected

No.	Animal symbol	Subcategory	Function of included symbols and reason for rejected symbols
1	eagle	birds	Category identifiers on group animal symbols - used in subcategory training and in the SUB Pre-test
2	flamingo	birds	
3	woodpecker	birds	
4	donkey	farm animals	
5	hen	farm animals	
6	sheep	farm animals	
7	butterfly	little creatures	
8	grasshopper	little creatures	
9	worm	little creatures	
10	bunny	pets	
11	goldfish	pets	
12	kitten	pets	
13	crab	water animals	
14	dolphin	water animals	
15	seahorse	water animals	
16	bear	wild animals	
17	snake	wild animals	
18	squirrel	wild animals	
19	bird	birds	36 test items for the 2 tests
20	ostrich	birds	
21	owl	birds	
22	parrot	birds	
23	cow	farm animals	
24	duck	farm animals	
25	goat	farm animals	
26	horse	farm animals	
27	ant	little creatures	
28	dragonfly	little creatures	
29	fly	little creatures	
30	ladybird	little creatures	
31	lizard	little creatures	
32	mouse	little creatures	
33	spider	little creatures	

No.	Animal symbol	Subcategory	Function of included symbols and reason for rejected symbols
34	budgie	pets	36 test items for the 2 tests (cont)
35	cat	pets	
36	dog	pets	
37	jellyfish	water animals	
38	octopus	water animals	
39	seal	water animals	
40	starfish	water animals	
41	stingray	water animals	
42	whale	water animals	
43	dinosaur	wild animals	
44	elephant	wild animals	
45	fox	wild animals	
46	gorilla	wild animals	
47	kangaroo	wild animals	
48	leopard	wild animals	
49	monkey	wild animals	
50	polar bear	wild animals	
51	rhino	wild animals	
52	skunk	wild animals	
53	tiger	wild animals	
54	zebra	wild animals	
55	bee	little creatures	5 animal symbols for the SUB Pre-test
56	giraffe	wild animals	
57	pig	farm animals	
58	puppy	pets	
59	shark	water animals	
60	camel	wild animals	5 animal symbols for the ALP Pre-test
61	frog	little creatures	
62	hippo	wild animals	
63	lion	wild animals	
64	snail	little creatures	

No.	Animal symbol	Subcategory	Function of included symbols and reason for rejected symbols
65	beetle	little creatures	3 animal symbols used for demonstration in instruction program
66	oyster	water animals	
67	wolf	wild animals	
68	peacock	birds	6 animal symbols for the participants to practice with in the instruction program
69	lamb	farm animals	
70	mosquito	little creatures	
71	hamster	pets	
72	fish	water animals	
73	koala bear	wild animals	
74	robin	birds	No specific use made of these symbols in the main study, but used as fillers for the visual displays for the two tests
75	seagull	birds	
76	rooster	farm animals	
77	cricket	little creatures	
78	beaver	wild animals	
79	hyena	wild animals	
80	panda bear	wild animals	
81	porcupine	wild animals	
82	pelican	birds	Not used - excess symbols from 120 available (After rejection of some of the 120 symbols, there were 92 symbols left. Only 81 were required for the visual displays)
83	stork	birds	
84	turkey	farm animals	
85	caterpillar	little creatures	
86	killer whale	water animals	
87	lobster	water animals	
88	walrus	water animals	
89	buffalo	wild animals	
90	bull	wild animals	
91	deer	wild animals	
92	hedgehog	wild animals	

Refected *after* testing (developmental stage)			
93	canary	birds	Rejected, either because of low subcategorisation scores, or low picture naming scores
94	crow	birds	
95	hummingbird	birds	
96	penguin	birds	
97	swan	birds	
98	vulture	birds	

No.	Animal symbol	Subcategory	Function of included symbols and reason for rejected symbols
99	chck(en)	farm animals	Rejected, either because of low subcategorisation scores, or low picture naming scores (cont.)
100	bat	little creatures	
101	chameleon	little creatures	
102	cockroach	little creatures	
103	moth	little creatures	
104	mouse2	little creatures	
105	scorpion	little creatures	
106	wasp	little creatures	
107	otter	water animals	
108	prawn	water animals	
109	chimpanzee	wild animals	
110	crocodile	wild animals	
111	rabbit	wild animals	
112	raccoon	wild animals	
113	reindeer	wild animals	
114	tortoise	wild animals	
115	birds	birds	Group symbols were not placed on the visual display.
116	farm animals	farm animals	
117	little creatures	little creatures	
118	pets	pets	
119	water animals	water animals	
120	wild animals	wild animals	

Rejected *before* testing (developmental stage)			
1	alligator/crocodile	wild animals	Rejected - another name for same animal
2	locust/grasshopper	little creatures	
3	animals	other	Rejected - collective name
4	cattle	farm animals	
5	baby animals	baby animals	Rejected - diminutive
6	calf	baby animals	
7	colt	baby animals	
8	duckling	baby animals	
9	joey	baby animals	
10	kid	baby animals	
11	piglet	baby animals	
12	tadpole	baby animals	

No.	Animal symbol	Subcategory	Function of included symbols and reason for rejected symbols
13	dragon	other	Rejected - mythical creature
14	monster	other	
15	animal	other	Rejected - not transparent
16	baby animal	baby animals	
17	insect	little creatures	
18	insects	little creatures	
19	shellfish	water animals	
20	bear (grizzly bear)	wild animals	Rejected - similarity to another animal
21	cheetah (leopard)	wild animals	
22	ox (cow)	farm animals	
23	turtle (tortoise)	water animals	
24	toad (frog)	little creatures	
25	black cat	pets	Rejected - specificity
26	Brontosaurus	other	
27	cockatoo	birds	
28	cuckoo	birds	
29	daddy longlegs	little creatures	
30	Dalmatian	pets	
31	Diplodocus	other	
32	Pteranodon	other	
33	rattlesnake	wild animals	
34	Stegasaurus	other	
35	Triceraptops	other	
36	armadillo	wild animals	Rejected - unfamiliar to South African children of target age group
37	badger	wild animals	
38	blue jay	birds	
39	boar	wild animals	
40	chipmunk	wild animals	
41	clam	water animals	
42	coyote	wild animals	
43	dingo	wild animals	
44	emu	birds	
45	firefly	little creatures	
46	gerbil	little creatures	
47	goose	farm animals	Rejected - unfamiliar to South African children of target age group (cont)
48	groundhog	wild animals	
49	guinea pig	pets	
50	hare	wild animals	
51	hawk	birds	
52	heron	birds	
53	iguana	wild animals	
54	jackal	wild animals	
55	kookaburra	birds	
56	llama	wild animals	
57	lyre bird	birds	
58	magpie	birds	
59	mole	little creatures	
60	moose	wild animals	
61	mule	farm animals	
62	newt	little creatures	
63	oppossum	wild animals	
64	parakeet	birds	
65	pheasant	birds	
66	platypus	water animals	
67	pond skater	little creatures	
68	puffin	birds	
69	quail	birds	
70	shrimp	water animals	
71	squid	water animals	
72	tropical fish	water animals	
73	wallaby	wild animals	
74	wombat	wild animals	

Appendix B: Development of a symbol list - scoring sheet

Name	
Number	
Gender	
Grade	
School / Centre	
Home language	
School language	

	Animal	Name given	Subcategory	Subcategory chosen
1	ant		little creatures	
2	bat		little creatures	
3	bear		wild animals	
4	beaver		wild animals	
5	bee		little creatures	
6	beetle		little creatures	
7	bird		birds	
8	budgie		pets	
9	buffalo		wild animals	
10	bull		wild animals	
11	bunny		pets	
12	butterfly		little creatures	
13	camel		wild animals	
14	canary		birds	
15	cat		pets	
16	caterpillar		little creatures	
17	chameleon		little creatures	
18	chicken		farm animals	
19	chimpanzee		wild animals	
20	cockroach		little creatures	
21	cow		farm animals	
22	crab		water animals	
23	cricket		little creatures	
24	crocodile		wild animals	
25	crow		birds	
26	deer		wild animals	
27	dinosaur		wild animals	
28	dog		pets	
29	dolphin		water animals	
30	donkey		farm animals	
31	dragonfly		little creatures	
32	duck		farm animals	

33	eagle		birds	
34	elephant		wild animals	
35	fish		water animals	
36	flamingo		birds	
37	fly		little creatures	
38	fox		wild animals	
39	frog		little creatures	
40	giraffe		wild animals	
41	goat		farm animals	
42	goldfish		pets	
43	gorilla		wild animals	
44	grasshopper		little creatures	
45	hamster		pets	
46	hedgehog		wild animals	
47	hen		farm animals	
48	hippo		wild animals	
49	horse		farm animals	
50	hummingbird		birds	
51	hyena		wild animals	
52	jellyfish		water animals	
53	kangaroo		wild animals	
54	killer whale		water animals	
55	kitten		pets	
56	koala bear		wild animals	
57	ladybird		little creatures	
58	lamb		farm animals	
59	leopard		wild animals	
60	lion		wild animals	
61	lizard		little creatures	
62	lobster		water animals	
63	monkey		wild animals	
64	mosquito		little creatures	
65	moth		little creatures	
66	mouse		little creatures	
67	octopus		water animals	
68	ostrich		birds	
69	otter		water animals	
70	owl		birds	
71	oyster		water animals	
72	panda bear		wild animals	
73	parrot		birds	
74	peacock		birds	
75	pelican		birds	
76	penguin		birds	
77	pig		farm animals	

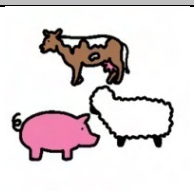
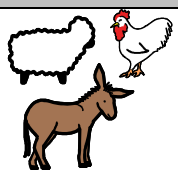
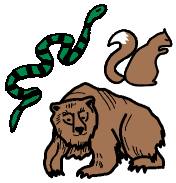
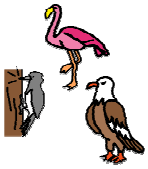
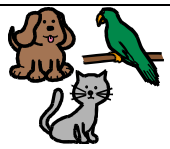
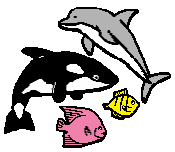
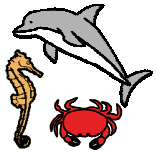
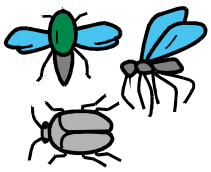
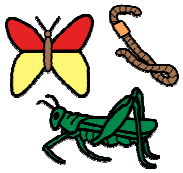
78	polar bear		wild animals	
79	porcupine		wild animals	
80	prawn		water animals	
81	puppy		pets	
82	rabbit		wild animals	
83	raccoon		wild animals	
84	rat		little creatures	
85	reindeer		wild animals	
86	rhino		wild animals	
87	robin		birds	
88	rooster		farm animals	
89	scorpion		little creatures	
90	seagull		birds	
91	seahorse		water animals	
92	seal		water animals	
93	shark		water animals	
94	sheep		farm animals	
95	skunk		wild animals	
96	snail		little creatures	
97	snake		wild animals	
98	spider		little creatures	
99	squirrel		wild animals	
100	starfish		water animals	
101	stingray		water animals	
102	stork		birds	
103	swan		birds	
104	tiger		wild animals	
105	tortoise		wild animals	
106	turkey		farm animals	
107	vulture		birds	
108	walrus		water animals	
109	wasp		little creatures	
110	whale		water animals	
111	wolf		wild animals	
112	woodpecker		birds	
113	worm		little creatures	
114	zebra		wild animals	
n/a	Birds		birds	
n/a	Farm Animals		farm animals	
n/a	Little Creatures		little creatures	
n/a	Pets		pets	
n/a	Water Animals		water animals	
n/a	Wild Animals		wild animals	

Appendix C: Name and category placement scores

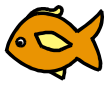
Grade	Grade 0		Grade 1				Grade 2				Grade 3	
Participant Number	0.1	0.2	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2
Gender	F	F	F	M	M	M	F	M	M	M	F	M
Expected name given to animal symbol	77	75	42	45	85	83	84	77	74	86	93	80
Placement of animal symbol into expected category	105	106	93	109	106	104	107	109	101	99	101	104

Total possible score = 120

Appendix D: Reworked PCS category group identifier symbols

No	Animal	Original PCS Symbol	Comment	Reworked PCS Symbol for the Main Study
1	Farm Animals		The cow and pig were required for the main study test items. The cow and the pig were replaced with a donkey and a hen.	
2	Wild Animals		The raccoon was not a familiar animal to the majority of the South African children of the target age range. The skunk was required for the main study. The raccoon and the skunk were replaced with a bear and a squirrel.	
3	Birds	None	No group symbol for Birds could be found amongst the PCS animal selection. Although some of the children could not name flamingo and woodpecker, these animals were fully understood by all the children as belonging to the Birds category.	
4	Pets		The puppy and the parrot were required for the main study. A bunny and a goldfish were added to the group. The goldfish was placed in an aquarium to maximise its association with the Pet category.	
5	Water Animals		The tropical fish and killer whale were not included in the list of 81 animals (only animals used in the visual displays of the main study could be represented in the category identifiers), and were replaced with a seahorse and a crab.	
6	Little Creatures		The original PCS symbol was more representative of Insects than the larger concept of Little Creatures which was required for the main study. The three PCS insects were replaced with a butterfly, worm and grasshopper.	

Appendix E: Changes to PCS animal symbols

	Animal	Original PCS symbol	Problem	Solution	Reworked Symbol
1	Budgie		The budgie was placed by some of the children in the Birds category.	The budgie was placed in a cage, so that it was clearly different from the other birds and facilitated it being understood as belonging to the Pets category.	
2	Goldfish		The goldfish was placed by some of the children in the Water Animals category.	The goldfish was placed in a fish bowl, so that it was clearly different from the other birds and facilitated it being understood as belonging to the Pets category.	
3	Hippo		The water that the hippo was standing in may have led to confusion when placing the hippo into the Water Animals rather than the Wild Animals category.	The water was removed, to prevent it being associated with the Water Animals group.	

Appendix F: Layout of visual displays

Layout of 81 symbols across the Alphabetical Order (ALP) visual display

	A	B	C	D	E	F	G	H	I	
1	**ANT**	bear	beaver	bee	beetle	**BIRD**	**BUDGIE**	bunny	butterfly	
2	camel	**CAT**	**COW**	crab	cricket	**DINOSAUR**	**DOG**	dolphin	donkey	**12**
3	**DRAGONFLY**	**DUCK**	eagle	**ELEPHANT**	fish	flamingo	**FLY**	**FOX**	frog	
4	giraffe	**GOAT**	goldfish	**GORILLA**	grasshopper	hamster	hen	hippo	**HORSE**	
5	hyena	**JELLYFISH**	**KANGAROO**	kitten	koala bear	**LADYBIRD**	lamb	**LEOPARD**	lion	**13**
6	**LIZARD**	**MONKEY**	mosquito	**MOUSE**	**OCTOPUS**	**OSTRICH**	**OWL**	oyster	panda bear	
7	**PARROT**	peacock	pig	**POLAR BEAR**	porcupine	puppy	**RHINO**	robin	rooster	
8	seagull	seahorse	**SEAL**	shark	sheep	**SKUNK**	snail	snake	**SPIDER**	**11**
9	squirrel	**STARFISH**	**STINGRAY**	**TIGER**	**WHALE**	wolf	woodpecker	worm	**ZEBRA**	
	14			**12**			**10**			

ANIMAL 36 animals selected for ALP test

number Number of test items occuring in each third of ALP

Layout of 81 symbols across the Subcategories (SUB) visual display

	A	B	C	D	E	F	G	H	I	
1	donkey	**GOAT**	**LEOPARD**	**SKUNK**	**DINOSAUR**	beaver	wolf	**OSTRICH**	**BIRD**	
2	**HORSE**	pig	lion	**RHINO**	**MONKEY**	giraffe	hippo	flamingo	robin	**12**
3	sheep	lamb	**FOX**	squirrel	hyena	**KANGAROO**	panda bear	seagull	**OWL**	
4	**COW**	hen	bear	porcupine	**POLAR BEAR**	koala bear	**ELEPHANT**	**PARROT**	eagle	
5	**DUCK**	rooster	snake	**GORILLA**	**ZEBRA**	camel	**TIGER**	woodpecker	peacock	**12**
6	hamster	bunny	**OCTOPUS**	**STINGRAY**	crab	frog	worm	**MOUSE**	**LADYBIRD**	
7	kitten	puppy	**STARFISH**	shark	**SEAL**	cricket	bee	**FLY**	**ANT**	
8	**CAT**	**DOG**	dolphin	**WHALE**	**JELLYFISH**	mosquito	grasshopper	**LIZARD**	beetle	**12**
9	**BUDGIE**	goldfish	fish	seahorse	oyster	butterfly	**SPIDER**	**DRAGONFLY**	snail	
	11			**12**			**13**			

ANIMAL 36 animals selected for SUB test

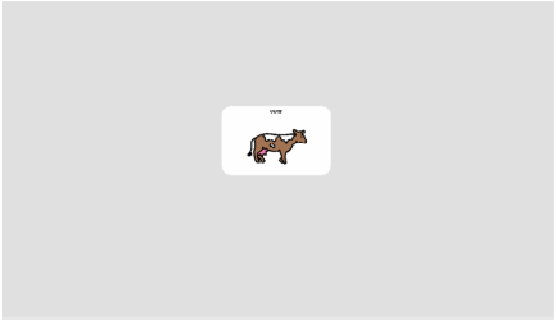
number Number of test items occuring in each third of SUB

Appendix G: The ALP and SUB tests and pre-tests

The two tests

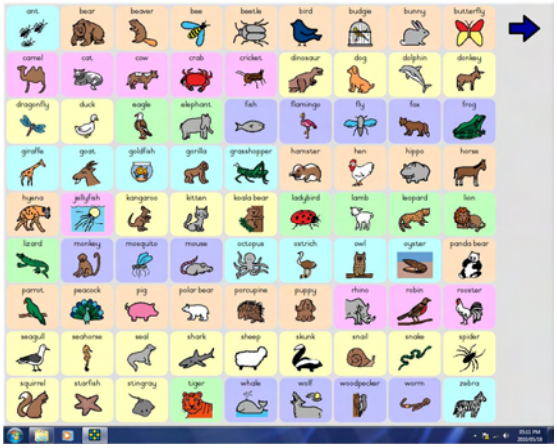
The two tests each required 36 test items within a set of 72 linked grids. There were 36 test item grids (A-type grids) and 36 visual display grids either with the symbols organised alphabetically or categorically (B-type grids).

The A-type grids held the test item and were a single symbol cell with a white background within a grey display.



Test item

When the participant clicked on the test item in the A-type grid, a B-type grid would immediately appear showing an array of 81 animal symbols arranged either alphabetically or subcategorically in 9 x 9 cells (see below).



Alphabetical Order (ALP) visual display

Subcategorisation (SUB) visual display

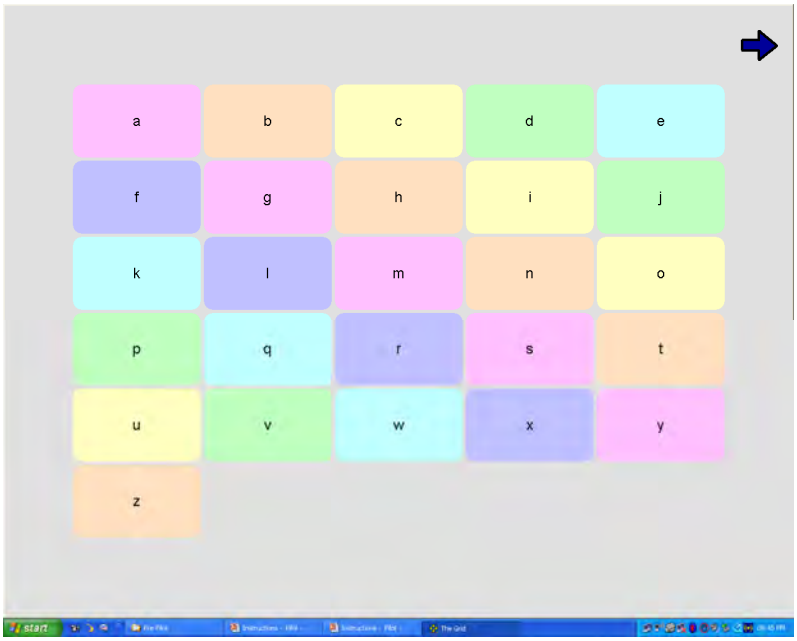
The participant's task was to locate and select the test item in the visual array. Once the symbol was selected, another single symbol (A-type grid) would appear. This process was repeated for each of the 36 test symbols.

The pre-tests

For the purposes of this study two pre-tests were designed – the ALP Pre-test and the SUB Pre-test. ALP Pre-test was designed to test the ability to determine the first letter of the animal name and to then find that letter in an alphabetically ordered array. SUB Pre-test was developed for testing the ability to subcategorise animals into the given groups.

ALP and SUB Pre-tests were both used to assist in setting the criteria for the selection of participants. There were 5 test items in each of the test, within a set of 10 linked grids. Two types of grids were used, namely A-type pre-test grids and B-type pre-test grids. These pre-test A-type grids were identical to the A-type grids in the tests. When the participant clicked on the animal symbol, a B-type grid would immediately appear. 4 out of the 5 test items had to be selected correctly for the participant to pass the pre-test selection criteria.

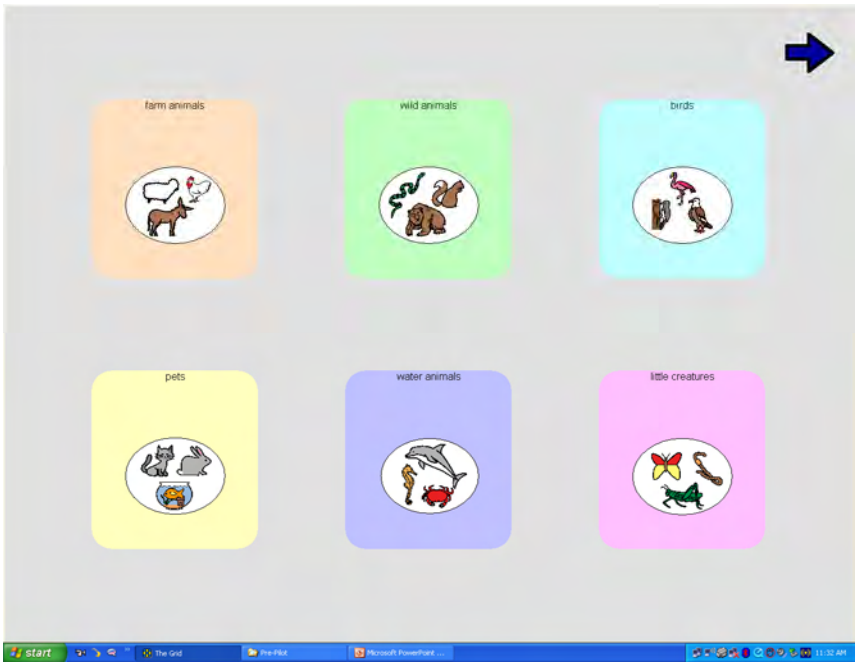
The B-type grid in ALP Pre-test was a sequence of the 26 letters of the alphabet in a 5 X 6 array. The participants' task was to allocate the animal symbol which had been observed on the previous screen (A-type grid) to the alphabet letter which represented the first letter of the animal name. Once the letter was located and selected, another single symbol (A-type grid) would appear. This process was repeated for 5 items.



ALP Pre-test – B-type grid

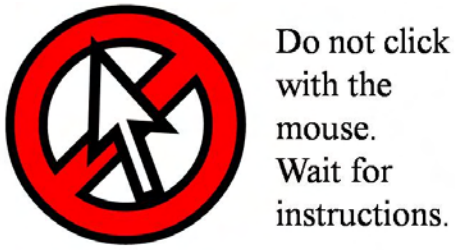
The B-type grid in the SUB Pre-test was a 3 x 2 array of 6 groups of animal symbols which represented the six subcategories of animals identified in Step 1. The participant's task was to allocate the animal symbol on the previous screen (A-type grid) to its subcategory. Once

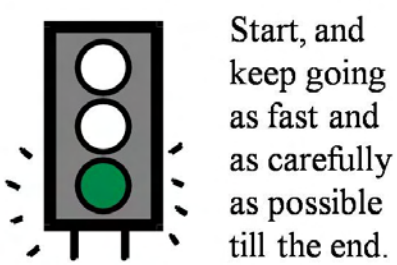
the group symbol was selected, another single symbol (A-type grid) would appear. This process was repeated for 5 items.

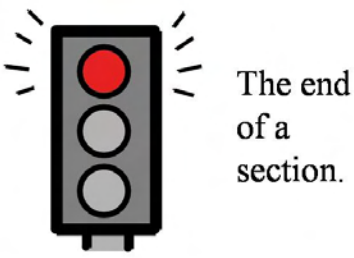


SUB Pre-test – B-type grid

The following three symbols (*wait*, *go* and *stop*) were used to guide the participants through the test procedure.







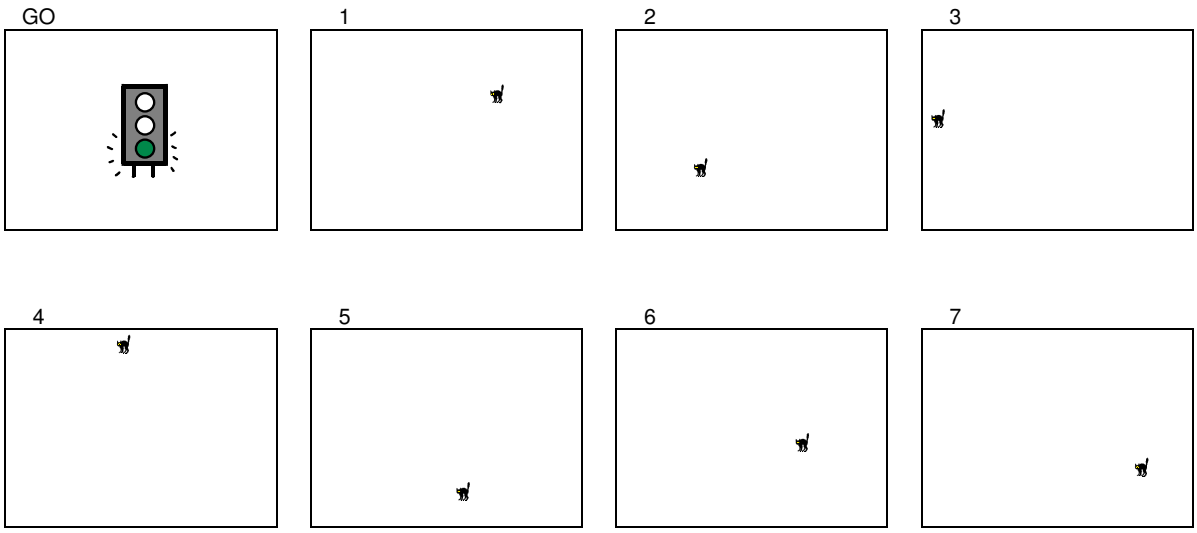
The symbols used to guide the participant through the test procedure

Appendix H: Mouse control screening

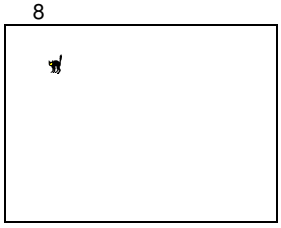
The mouse control screening took the form of timing the participants as they clicked on a small symbol (a cat) with the mouse for 20 mouse clicks. As the cat was located with the mouse, it appeared in another position on the screen, and the participants had to keep on locating the cat until the end of the task, indicated by a stop sign. It operated in a continuous manner. Once the participants started, they could continue to the end without any input from the administrator.

The exact sequence of steps of the mouse control screening and all the positions on the screen that the cat appeared in is presented below. The positions of the cat were chosen to cover the full area of the screen and to have large variations in position relative to the previous position. The size of the cat in the mouse control screening was chosen to be smaller than any of the cell sizes that the participants had to click on in the main study.

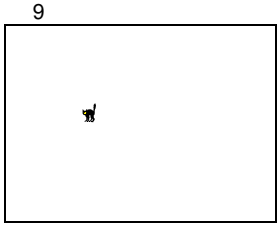
The mouse control screening was designed using *The Grid™* software (The Grid, 2002). Each new screen was a single-cell, interlinked grid. The mouse control screening was originally designed for the researcher's masters thesis (Herold, 2004).



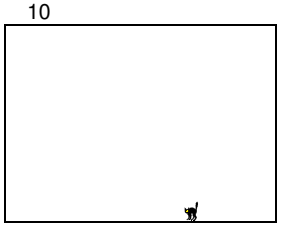
8



9

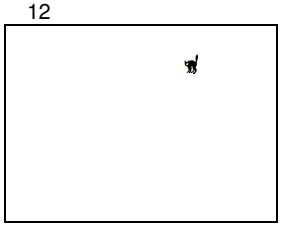


10

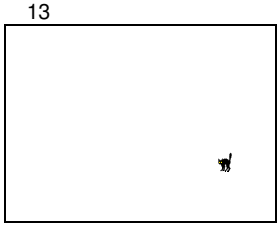


11

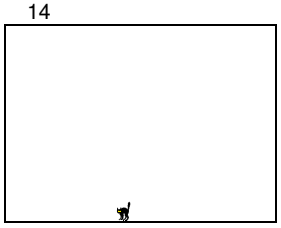
12



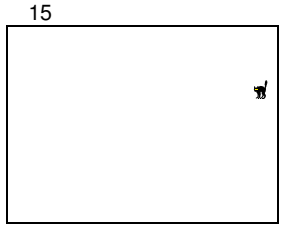
13



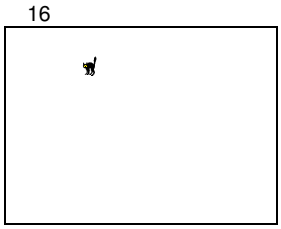
14



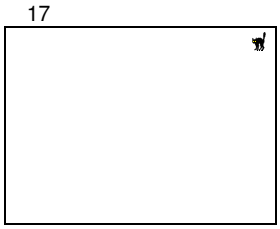
15



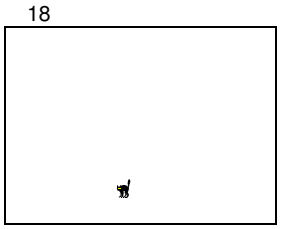
16



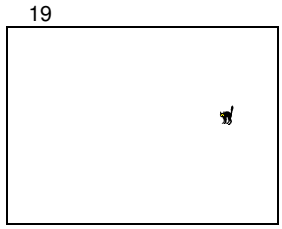
17



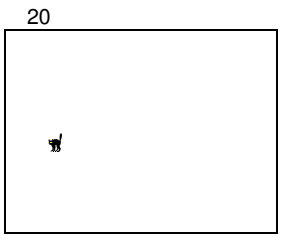
18



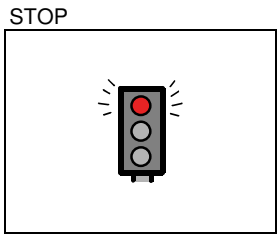
19



20



STOP



Appendix I: Overview of administration process

The computer program guided the research assistant through the following procedures. The registration slip indicated which pathway through the test the participant had to be guided.

Group A		Group B	
Session 1	Session 2	Session 1	Session2
Administration Subject Number Session Grade Gender Researcher Computer	Administration Subject Number Session Grade Gender Researcher Computer	Administration Subject Number Session Grade Gender Researcher Computer	Administration Subject Number Session Grade Gender Researcher Computer
Mouse Screening	Mouse Screening	Mouse Screening	Mouse Screening
SUB Pre-test 6 practice items 5 test items	ALP Pre-test 6 practice items 5 test items	ALP Pre-test 6 practice items 5 test items	SUB Pre-test 6 practice items 5 test items
SUB Test 6 practice items 36 test items	ALP Test 6 practice items 36 test items	ALP Test 6 practice items 36 test items	SUB Test 6 practice items 36 test items
Break	Break	Break	Break
Administration Subject Number Session Grade Gender Researcher Computer	Administration Subject Number Session Grade Gender Researcher Computer	Administration Subject Number Session Grade Gender Researcher Computer	Administration Subject Number Session Grade Gender Researcher Computer
ALP Pre-test 6 practice items 5 test items	SUB Pre-test 6 practice items 5 test items	SUB Pre-test 6 practice items 5 test items	ALP Pre-test 6 practice items 5 test items
ALP Test 6 practice items 36 test items	SUB Test 6 practice items 36 test items	SUB Test 6 practice items 36 test items	ALP Test 6 practice items 36 test items

Appendix J: Workbook instructions

Materials needed

1. Subject booklet – A4 sheets of paper stapled in the top left-hand corner
2. Pencil
3. White board for each child to press on
4. Large version of the booklet as a visual aid
5. Laptop to demonstrate the test program

The children were taught in a group, all classes of the same grade together, in one of that grade's classrooms. The children used their own white boards and pencils. Each child was given a booklet that was worked through during the instruction phase. The instructor had a large version of the booklet to use as a visual aid. The instructor stood in front of the classroom and all the actions required of the children were modeled on the booklet. The children sat on the floor so that they could see the visual aids and computer screen clearly. Children who did not assent to participation were requested to remain quietly where they were and watch. After each instruction to execute a task, time was given for the children to respond. Visual checks by the research assistants and teachers present were made to ensure that they were performing the task correctly. Children were facilitated where necessary.

Section		Time	Script
Introduction	Introduce self and study	2 min.	*Good morning, boys and girls. Firstly, I want to introduce myself. My name is Marina Herold. I am an occupational therapist and I am developing a computer program. But I need your help to understand how easy it is for children your age to find a picture hidden somewhere among many pictures on a computer screen. Thank you very much for being part of this study and helping me to find out what I need to know.* *Let me explain a little how this is going to work. Today I am going to teach you how to use the computer program. On one of the next three days, you will be able to work the computer program yourself. All you will need to do in the computer program is to try and find hidden pictures as quickly as possible. It will be easy and fun for you to work through the program. And when you have finished, you will be given a little gift to thank you for helping me.*
	Request assent		*I need to know if you give your permission to be part of this study. If you are ok with it I want you to put a circle around the word 'Yes' on the paper in front of you. If you really don't want to do this, you don't have to, and you can put a circle around the word 'No'. Is there anybody who doesn't want to do this computer game?* (Pause. If there is anybody who says 'No', ask them to sit quietly where they are and watch.)
	Fill in forms		*Let's begin. You have a booklet and a pencil. Please circle the 'Yes'.* (Pause)

Concept of subcategories	Explain concept by using six examples	6 min.	*Now turn to page 2 of your booklet.* (Pause.) *There are many, many animals in this world. If I had to put them all on one page like this one, it could take me a long, long time to find the one I was looking for. But what if I organized the animals a little better, rather than just having them all mixed up? That might make it easier to find the one I want, wouldn't it?* *Now turn to page 3 of your booklet.* (Pause.) *The first way we are going to organise our animals is to place them in categories or groups, depending on what kind of animal they are. In front of you are six categories or groups of animals.* *Firstly, we have the farm animals.* (Point to the first group – the ones with the orange background.) *These are the farm animals. Farm animals are animals that live and work on a farm. For example, sheep and donkeys and hens all live on farms.* *Then, we have the wild animals.* (Point to the next group – the ones with the green background.) *These are the wild animals. Wild animals live out in the wild. You will find these animals in the jungles, the deserts and the zoos. Wild animals are animals like bears and snakes and squirrels.* *Next we have the birds.* (Point to the group with the light blue background.) *This is the birds group. Birds are animals with feathers that can fly. For example, woodpeckers and eagles and flamingoes are all birds.* *Then there are the pets.* (Point to the group with the yellow background.) *This is the pets group. Pets are animals that we care for and have living with us in our homes. For example, we often see people having kittens and bunnies and goldfish as pets.* *Another group is the water animals.* (Point to the group with the dark blue background.) *This is the water animals group. Water animals are animals that live in rivers and dams and seas. There are many animals that live near water and who like water, but in this group we have those animals who live in water most of the time or they will die. Water animals are animals such as dolphins, seahorses and crabs.* *The last group is the little creatures.* (Point to the group with the pink background.) *These are the little creatures. Little creatures are the small animals, the creepy crawlies, the "goggas". Butterflies, worms and grasshoppers are examples of little creatures.*
	Three demonstra-tion examples		*Let's see if we can decide which animals go where.* *At the top of your page is a row of pictures. The first one is a wolf. I am sure you will all agree that a wolf is a wild animal – it lives in the wild. Draw a line from the wolf to your wild animal group.* *The second one is an oyster. Oysters live in the sea, so let's draw a line from the oyster to the water animals group.* *What about the beetle? Beetles are little creatures, so let's draw a line from the beetle to the little creatures group.*
	Six practice examples		*Now it is your turn to try.* *The next picture is of a peacock. Where would you put the peacock? I will give you a moment to think about which group the peacock belongs to and for you to draw a line from the peacock to that group.* (Pause.) *Do you all agree that because the peacock has feathers, the best place for the peacock is in the birds group?* *Now it is the lamb. Into which group do you think we should put the lamb? Draw a line from the lamb to the group you think it belongs in.* (Pause.) *Would you agree that the best place for the lamb is with the farm animals?* *Now look at the koala bear. Into which group would you put the koala bear? Think about it and then draw a line from the koala bear to the group it belongs in.* (Pause.) *I put the koala with the wild animals because it lives in the wild. Did you?* *The next picture is the mosquito. Think about which group the mosquito belongs to and then draw a line from the mosquito to that group.* (Pause.) *I think the mosquito fits best with the little creatures. Do you agree?* *The next picture is the fish. Draw a line from the fish to the group you think it belongs in.* (Pause.) *Do you all agree that the best place for the fish is with the water creatures? Fish can only live in water.* *The last picture is the hamster. To which group do you think the hamster belongs? Draw a line from the hamster to the group you think is best.* (Pause.) *I put the hamster with the pets group, because many people have pet hamsters.* *That was quite easy, don't you think? Does anyone have any questions?* (Pause.)

Using subcategories to locate symbols in visual field	Explain concept	6 min.	*Turn now to page 4 of your booklet.* (Pause.) *All the animals have been grouped into the six categories we spoke about just now. In the top left hand corner of the page are all the farm animals, grouped together with an orange background. Next to the farm animals is a group of wild animals, grouped together with a green background. On the top right hand side are all the birds, grouped together with a light blue background. In the bottom left hand corner of the page, you will see all the pets, grouped together with a yellow background. Next to the pets are the water animals, grouped together with a dark blue background. In the right hand bottom corner are all the little creatures, grouped together with a pink background.*
	Three demonstra-tion examples		*Let's try and find our animals again.* *Look at the first picture at the top of the page. It is the wolf. We decided that the wolf is a wild animal, so if we want to find the wolf quickly, we must go to the wild animal group, the green group, to look for the wolf. Can you find it? Draw a line from the wolf at the top of the page to the wolf in the big picture.* (Pause.) *The next picture is of the oyster. The oyster is a water animal so if we want to find the oyster quickly, we must go to the water animal group, the dark blue group to look for the oyster. Can you find the oyster? Draw a line from the oyster at the top of the page to the oyster in the group of water animals.* (Pause.) *What about the beetle? The beetle is a little creature, so if you want to find the beetle quickly, you can go to the little creature group, the pink group, and look for it there. Can you find it? Draw a line from the beetle at the top of the page to the beetle in the little creatures group.* (Pause.)
	Six practice examples		*Now I am going to let you try some on your own.* *The next picture is of a peacock. Can you find the peacock on your picture board? I will give you a moment to think about which group the peacock belongs to and to find the peacock as quickly as you can. When you have found the peacock, draw a line from the peacock at the top of the page to the peacock in the big picture.* (Pause.) *Did you find the peacock with the birds?* *Now it is the lamb picture. Think about which group you will find the lamb in, and then find the lamb as quickly as you can. When you have found the lamb, draw a line from the lamb at the top of the picture to the lamb in the big picture.* (Pause.) *Did you find the lamb with the farm animals?* *Next is the koala bear. Think about which group you would find the koala bear in, and then find the koala bear as fast as you can. When you have found the koala bear, draw a line from the koala bear at the top of the page to the koala bear in the big picture.* (Pause.) *Did you find the koala bear with the wild animals?* *Now let's look at the mosquito. Decide quickly in which group you would find the mosquito, then go and look there for the mosquito. When you have found the mosquito draw a line from the mosquito at the top of the page to the mosquito in the big picture.* (Pause.) *Did you find the mosquito with the little creatures?* *The next picture is the fish. In which group will you find the fish? Quickly go to that group and look for the fish. When you have found the fish, draw a line from the fish at the top of the page to the fish in the big picture.* (Pause.) *Did you find the fish with the water creatures?* *The last picture is the hamster. In which group will you find the hamster?* (Pause.) *Go to that group and find the hamster as quickly as you can. When you have found the hamster, draw a line from the hamster at the top of the page to the hamster in the big picture.* (Pause.) *Did you find the hamster in the pets group?* *I am sure you found that quite easy to do, didn't you? Does anyone have any questions?* (Pause.)

Concept of initial phonic of word	Explain concept	5 min.	Note: Each time a letter is mentioned, it will be given in both its forms e.g.. 'a' (name) and 'a' (sound). At appropriate times, the children will be given time to respond. *Please turn to page 5 of your booklet.* (Pause.) *The second way we are going to organise our animals is to order them alphabetically. In front of you is an alphabet. The alphabet has a special order, starting with 'a' and ending with 'z'.* (Point to the 'a' and the 'z'.) *Each letter of the alphabet has it own special place in the order. It is always in the same order.* *Let's see if we can decide which letter our animals belong to.*
	Three demonstra-tion examples		*Look at your first picture. It is a wolf. Wolf starts with a 'w'. A 'w' comes near the end of the alphabet, so start looking for the 'w' at the end of the letters. When you have found the 'w', draw a line from the wolf to the block with the 'w' in it.* *Now let's try the oyster. Oyster starts with the letter 'o'. Look for the 'o'. An 'o' is not at the beginning but also not at the end of the alphabet, so start looking for the 'o' more or less in the middle of the letters. When you have found the 'o', draw a line from the oyster to the block with the letter 'o' in it.* *What about the beetle? Beetle starts with the letter 'b'. A 'b' is the second letter of the alphabet, so look for the 'b' at the beginning of the letters. When you have found the 'b', draw a line from the beetle to the block with the 'b' in it.*
	Six practice examples		*Now it is your turn to try.* *The next picture is a peacock. Peacock starts with the letter 'p'. A 'p' is a letter quite far in the alphabet, so I would look somewhere after the middle but not near the end yet. Can you find it?* (Pause.) *When you have found the 'p', draw a line from the peacock to the block with a 'p' in it.* *Now let's think about the lamb picture. Lamb starts with the letter 'l'. An 'l' is quite far in the alphabet, but before the middle. Can you find the 'l'?* (Pause.) *When you have found the 'l', draw a line from the lamb to the block with a 'l' in it.* *The koala bear picture is next. Koala bear starts with the letter 'k'. A 'k' is quite deep in the alphabet, but also before the middle. Can you find the 'k'?* (Pause.) *When you have found the 'k', draw a line from the koala bear to the block with a 'k' in it.* *Now let's think about the mosquito. Mosquito starts with the letter 'm'. An 'm' is in the middle of the alphabet, so begin to look somewhere in the middle of the letters. Can you find the 'm'?* (Pause.) *When you have found the 'm', draw a line from the mosquito to the block with a 'm' in it.* *The next picture is the fish. Fish starts with the letter 'f'. An 'f' is fairly near the beginning of the alphabet, so look for the 'f' near the beginning of the letters. Can you find the 'f'?* (Pause.) *When you have found the 'f', draw a line from the fish to the block with an 'f' on it.* *The last picture is the hamster. Hamster starts with the letter 'h'. An 'h' is in the first half of the alphabet. Can you find the 'h'?* (Pause.) *When you have found the 'h', draw a line from the hamster to block with a 'h' in it.* *That was quite easy, don't you think? Does anyone have any questions?* (Pause.)

Using alphabetic order to locate symbols in visual field	Explain concept	6 min.	*Please turn to page 6 of your booklet.* (Pause.) *Look at the top left-hand corner of the board and point to the group of animals starting with the letter 'a'. Animals starting with the letter 'a' have a light blue background. There is only one in this group. Now point to the next group, the group of animals starting with the letter 'b'. Animals starting with the letter 'b' have an orange background. There are quite a lot of animals in this group. There are also quite a lot of animals starting with the letter 'c', which have a pink background. Point to them. Keep moving along the lines and find the letter groups. So, after the 'c' group, we have the yellow 'd' group, and then the light green 'e' group, and then the dark blue 'f' group. Keep moving along the lines, and see how the colour changes when the starting letter of the animal words change. Next we have the light blue 'g' group and then the orange 'h' group. Some letters don't have any animals in their group, like the 'i' group. Next comes the pink 'j' group with only one animal in it, followed by the yellow 'k' group which is a little bigger again. Keep pointing along the lines and find the green 'l' group and the dark blue 'm' group. Notice that there are no 'n' animals, but there is a light blue 'o' group and an orange 'p' group. There is no 'q' animal group. The next group is the dark pink 'r' group, followed by a big yellow's' group and a small green 't' group. There is no 'u' group and no 'v' group. The next group is a big dark blue 'w' group. There is no 'x' group and no 'y' group. The page finishes with a small light blue 'z' group.*
	Three demonstra-tion examples		*Let's see if we can now find the animals we are looking for in the big picture.* *Look at the first picture. It is a wolf. Wolf starts with the letter 'w'. A 'w' comes near the end of the alphabet, so start looking for the wolf by the 'w' animals in the last row of the animals. When you have found the wolf, draw a line from the wolf at the top of the page to the wolf in the big picture.* *Now take your oyster sticker. Oyster starts with the letter 'o'. Look for the oyster in the group of animals starting with the letter 'o'. They will be more or less in the middle of all the animals. When you have found the oyster, draw a line from the oyster at the top of the page to the oyster in the big picture.* *What about the beetle? Beetle starts with the letter 'b'. A 'b' is the second letter of the alphabet, so start looking for the beetle in the first row of the animals. When you have found the beetle, draw a line from the beetle at the top of the page to the beetle in the big picture.*
	Six practice examples		*Now it is your turn to try.* *The next picture is a peacock. Peacock starts with the letter 'p'. A 'p' is a letter quite far in the alphabet, so I would look for the peacock somewhere after the middle but not near the end yet. Can you find it?* (Pause.) *When you have found the peacock, draw a line from the peacock at the top of the page to the peacock in the big picture.* *Now let's think about the lamb picture. Lamb starts with the letter 'l'. A 'l' is quite far in the alphabet, but before the middle, so I would look for the lamb somewhere near the middle of the picture. Can you find it?* (Pause.) *When you have found the lamb, draw a line from the lamb at the top of the page to the lamb in the big picture.* *The koala bear picture is next. A koala bear starts with the letter 'k'. A 'k' is quite deep in the alphabet, but also before the middle, so look for the koala bear somewhere near the middle. Can you find the koala bear?* (Pause.) *When you have found it, draw a line from the koala bear at the top of the page to the koala bear in the big picture.* *Now let's think about the mosquito. Mosquito starts with the letter 'm'. A 'm' is in the middle of the alphabet, so begin to look for the mosquito somewhere in the middle of the letters. Can you find the mosquito?* (Pause.) *When you have found the mosquito, draw a line from the mosquito at the top of the page to the mosquito in the big picture.* *The next picture is the fish. Fish starts with the letter 'f'. An 'f' is fairly near the beginning of the alphabet, so look for the fish near the beginning of the letters. Can you find the fish?* (Pause.) *Draw a line from the fish at the top of the page to the fish in the big picture.* *The last picture is the hamster. Hamster starts with the letter 'h'. An 'h' is in the first half of the alphabet, so look for the hamster in the first half of the picture. Can you find the hamster?* (Pause.) *Draw a line from the hamster at the top of the page to the hamster in the big picture.* *I am sure you found that quite easy to do, didn't you? Does anyone have any questions?* (Pause.)

Subcategories pretest on the computer	Explain concept	1 min.	*When you work on the computer program, you are going to do almost exactly the same as you have just done now in your workbook. The only difference is that instead of drawing lines you will click with your mouse. Look at the screen. If you see a 'no click' sign like this you must wait to hear what you must do. When you know what to do, you can click on it. You will then see a green traffic light. Once you click on the green light, the program is starting. When you see the picture of a red traffic light, you know you have finished that section and you can wait to be told what to do next.* *In the first section, you must show which group the animal belongs to. You will see an animal in the centre of your screen.*
	Three demonstra-tion examples		*The first one is a wolf. You must make sure you have seen the animal picture and can remember what it is. When you are ready, you will click on the wolf. The wolf will disappear and a screen of the six animal groups will appear.* *Now you will have to decide which of the six groups the wolf belongs to. Can you remember what it was? Yes, it is the wild animals. So, you must click on the wild animals group. Another animal will appear. It is the oyster. The oyster is a water animal so you must click on the water animals group. Next is the beetle, which belongs in the little creatures group.* *It is as simple as that! And don't worry – if you ever forget what the animal picture was, just click on the forward arrow in the top corner and the next animal will appear for you.*
Subcategories subtest on the computer	Explain concept	1 min.	*In the next section you must try and find the animals in the big picture, where all the animals are in their groups. A picture of an animal will appear. Remember it and then click on it. The screen will fill with the big picture of all the animals. Your job will be to find the animal as quickly as you can. Don't waste time. But don't be careless either. Think where is a good place to look for the animal you just saw and then search for that exact picture. When you have found it, click on it. There will be quite a lot of animal pictures to find. Just keep going as fast as you can and don't stop or slow down until you see the red traffic light. If you forget what picture you are looking for, don't worry, there will be a way out. Click on the forward arrow in the top right-hand corner. Can you see it? Of course, try not to use it, but if you have forgotten your picture, it is more important to keep going than to stop and waste time.*
	Three demonstra-tion examples		*The first picture is of a wolf. I must look for the wolf in the wild animals. There he is. I click on the wolf and a new animal appears. It is an oyster. The oyster must be here in the water animals section. There he is. I click on the oyster, and a beetle appears. The beetle has to be with the little creatures. There he is. When the picture of a red traffic light appears, you know you are finished with that section.* *It is as simple as that! And don't worry – if you ever forget what the animal picture was, just click on the forward arrow in the top corner and the next animal will appear for you.*
Alphabetic order pretest on the computer	Explain concept	1 min	*In the third section, you have to click on the letter block that you think is the one the animal word starts with. When a picture of an animal appears, you must make sure you have seen the animal and remember what it was. When you are ready, you will click on the animal. The animal will disappear and a screen of all the alphabet letters will appear. You will then have to decide which letter the animal starts with. When you have decided, you will need to click on the letter you have chosen. Another animal will appear.*
	Three demonstra-tion examples		*Let me demonstrate to you on the computer how it will all work. I start by clicking on the green traffic light. An animal picture of a wolf appears. A wolf starts with the letter 'w'. A 'w' comes near the end of the alphabet, so I can begin to look there. Here is the 'w'. I must click on it. The oyster starts with an 'o' and an 'o' is somewhere in the middle of the alphabet. Here is the 'o'. I click on the 'o'. Another animal appears. This time it is a beetle. Beetle starts with the letter 'b'. A 'b' comes very near the beginning of the alphabet, so that is where I will find it. Here it is. I click on it. I have come to the red robot, so I know this section is finished.* *It is as simple as that! And don't worry – if you ever forget what the animal picture was or what letter you are looking for, just click on the forward arrow in the top corner and the next animal will appear for you.*

Alphabetic order subtest on the computer	Explain concept	1 min	*In the last section, you must try and find the animal picture in the big picture, where all the animals are in alphabetical order. Your job will be to find the animal as quickly as you can. Don't waste time. But don't be careless either. Think where is a good place to look for the animal you just saw and then search for that exact picture. When you have found it, click on it. There will be quite a lot of animal pictures to find. Just keep going as fast as you can and don't stop or slow down until you see the red traffic light. If you happen to forget what picture you are looking for, don't worry, there will be a way out. Click on the forward arrow in the top right-hand corner. Can you see it? Of course, try not to use it, but if you have forgotten your picture, it is more important to keep going than to stop and waste time. When you see the picture of a red traffic light, you will know you have come to the end of that section.*
	Three demonstra-tion examples		*Let me demonstrate to you on the computer how it will all work. Let's try and find our practice animals in the big picture. The first picture is of a wolf. Wolf starts with a 'w' and a 'w' comes near the end of the alphabet, so I must look for the wolf here near the end of the screen. There he is. I click on the wolf and another picture appears. It is an oyster. The oyster starts with the letter 'o', and the letter 'o' is near the middle of the alphabet, so I must look somewhere near the middle. There it is. I click on the oyster and another picture appears. This time it is the beetle. The beetle starts with the letter 'b', and a 'b' is near the beginning of the alphabet, so I will look right at the top, over here. There's the beetle. I click on the beetle. I carry on this way until a red traffic light appears. Then I know I have finished that section. And don't worry – if you ever forget what the animal picture was, just click on the forward arrow in the top corner and the next animal will appear for you. Do you have any questions? (*Pause*).*
Closing	Thank you	1 min	*Well, that's it. I am sure you will all manage just fine with the computer program.* *Thank you so much for helping me with my work.*
	Gift		*As a 'thank you' to you, there is a chocolate for each of you.*

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&
INTERFACE

University of Pretoria

2006 *Laureate Award, Education Innovation for the Fofa Project*
2004 *T-Systems Age of Innovation & Sustainability Awards: Excellence in Innovation and Sustainability: Social*
2003 *National Science & Technology Awards: Corporate Organization over the last ten years.*
2002 *Shirley McNaughton Award for Exemplary Communication received from the International Society for Augmentative and Alternative Communication*
1998 *Rolex Award for Enterprise: Associate Laureate*
1995 *Education Africa Presidential Award for Special Needs*

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University of Pretoria, Lynnwood Road
PRETORIA, 0002
SOUTH AFRICA

I want to take part in the research project on visual displays at The King's Preparatory School.

(Please circle one of the words)

Yes No

Name _____ Grade _____

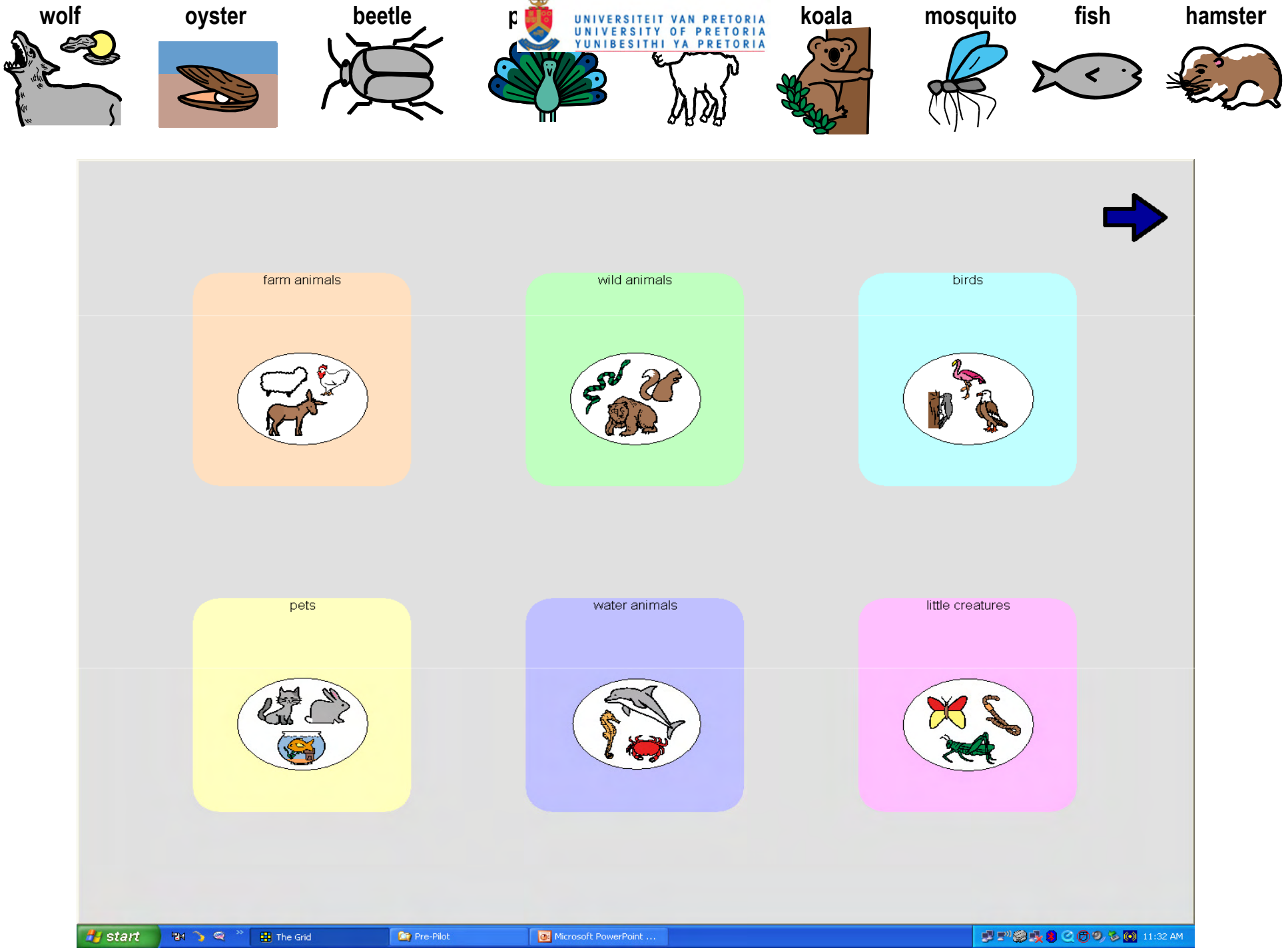
Date of Birth _____ Date _____

_____ _____
Marina Herold Date
Occupational Therapist and Communication Specialist
B.Sc (OT) (Wits), MAAC (UP)
011-463-5203

_____ _____
Prof Kitty Uys Date
University of Pretoria
Centre of Augmentative and Alternative Communication
012-420-2001


hyena
pig
duck
peacock
wolf
mouse
zebra
lizard
elephant
seahorse
bunny
dinosaur
dog
deer
fly
owl
hen
hamster
monkey
beetle
fish
giraffe
jellyfish
ostrich
horse
snake
kitten
shark
bird
tiger
snail
kangaroo
cricket
whale
donkey
ant
polar bear
stingray
ladybird
skunk
hippo
woodpecker
sheep
squirrel
lion
puppy
crab
robin
oyster
lamb
koala bear
parrot
cat
grasshopper
dolphin
leopard
starfish
beaver
flamingo
butterfly
rooster
dragonfly
porcupine
seagull
panda bear
camel
mosquito
budgie
bear
bee
goldfish
spider
octopus
worm
seal
eagle
cow
fox
goat

Appendix K.2


wolf
oyster
beetle
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
koala
mosquito
fish
hamster
farm animals
wild animals
birds
pets
water animals
little creatures
start
The Grid
Pre-Pilot
Microsoft PowerPoint ...
11:32 AM

Appendix K.3

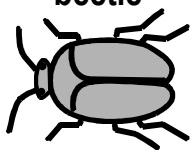

wolf
oyster
beetle
koala
mosquito
fish
hamster


donkey
goat
leopard
skunk
dinosaur
beaver
wolf
ostrich
bird
horse
pig
lion
rhino
monkey
giraffe
hippo
flamingo
robin
sheep
lamb
fox
squirrel
hyena
kangaroo
panda bear
seagull
owl
cow
hen
bear
porcupine
polar bear
koala bear
elephant
parrot
eagle
duck
rooster
snake
gorilla
zebra
camel
tiger
woodpecker
peacock
hamster
bunny
octopus
stingray
crab
frog
worm
mouse
ladybird
kitten
puppy
starfish
shark
seal
cricket
bee
fly
ant
cat
dog
dolphin
whale
jellyfish
mosquito
grasshopper
lizard
beetle
budgie
goldfish
fish
seahorse
oyster
butterfly
spider
dragonfly
snail
05:13 PM
2010/05/18

Appendix K.4


wolf


oyster


beetle


p
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koala


mosquito


fish


hamster


a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
r
s
t
u
v
w
x
y
z
start
Pre-Pilot
Instructions - Pilot - ...
Instructions - Pilot - ...
The Grid
08:45 PM

Appendix K.5


wolf
oyster
beetle
koala
mosquito
fish
hamster


ant
bear
beaver
bee
beetle
bird
budgie
bunny
butterfly
camel
cat
cow
crab
cricket
dinosaur
dog
dolphin
donkey
dragonfly
duck
eagle
elephant
fish
flamingo
fly
fox
frog
giraffe
goat
goldfish
gorilla
grasshopper
hamster
hen
hippo
horse
hyena
jellyfish
kangaroo
kitten
koala bear
ladybird
lamb
leopard
lion
lizard
monkey
mosquito
mouse
octopus
ostrich
owl
oyster
panda bear
parrot
peacock
pig
polar bear
porcupine
puppy
rhino
robin
rooster
seagull
seahorse
seal
shark
sheep
skunk
snail
snake
spider
squirrel
starfish
stingray
tiger
whale
wolf
woodpecker
worm
zebra
05:11 PM
2010/05/18

Appendix K.6

A structured script was provided for the research assistants to guide them through the various steps of the test. There were two versions of this instruction guide, which were identical in every way except for the order in which the two groups of participants were presented with the tests during the testing procedure.

Group A

(Switch on the voice recorder.)

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Administration 1 *(Click on the word.)*

Hello. What is your name?

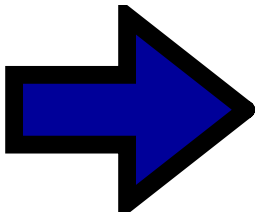
(Make a 'small talk' comment if you want to, to make the subject feel comfortable.)

Which side would you like the mouse on? *(Move it to the appropriate side if necessary.)*

Please give me your card. Let me fill in all your information. (*Fill in all the information.)*

The only rules you need to remember are ....

If you see one of these 'NO CLICK' signs *(point to the picture),* just wait to hear what you must do next.



If you don't know what to do or forget what you have to find, don't worry. Just click on the arrow like this one *(point to the arrow)* in the top corner of the page, and it will move on the next one.

Appendix L.2

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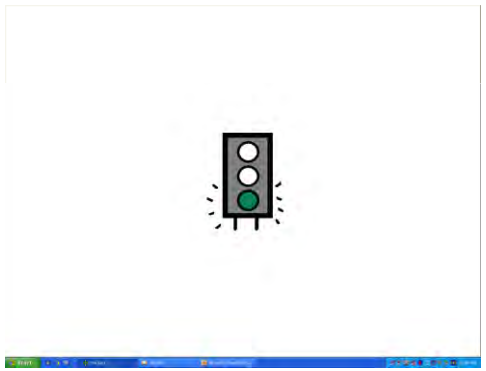
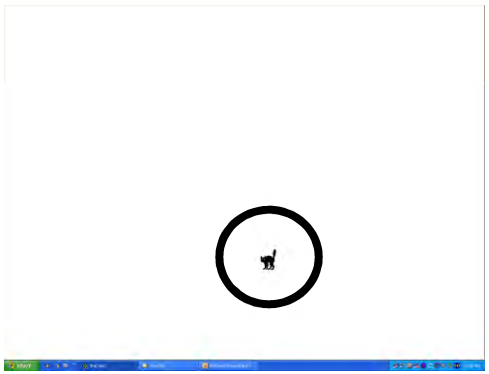
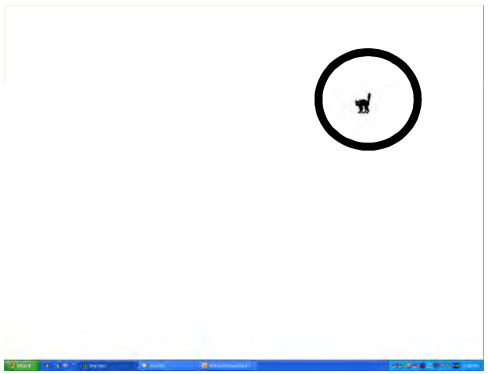
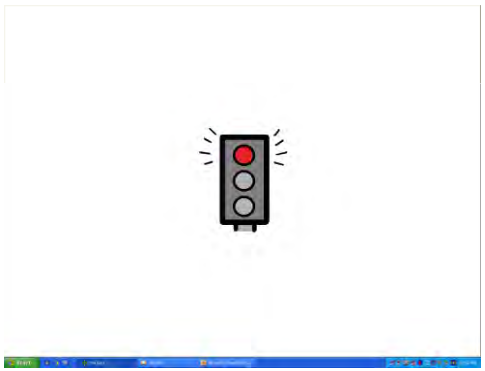
Mouse Screening *(Click on the word.)*

(Point to the pictures below as you explain what to do.)

In this section, you have to chase a little cat around the screen as fast as you can. When you are ready, click on the green robot. A little cat will appear. Click on the cat. It will move. Keep clicking on the cat until the red robot appears.

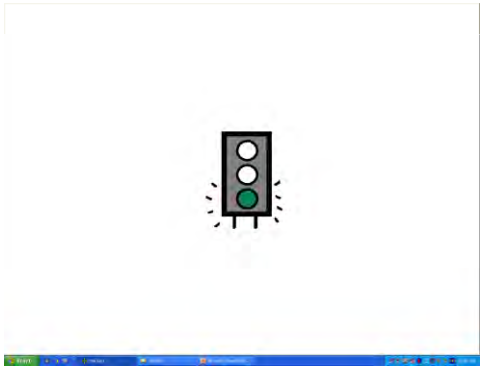
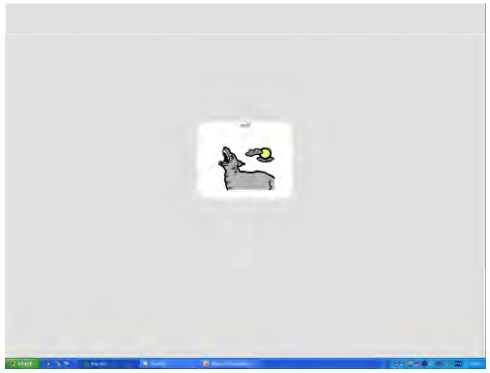
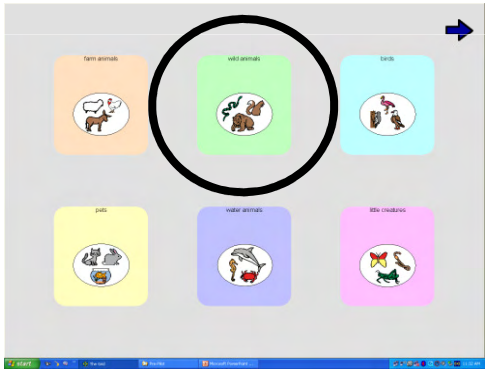
There are 20 cats to catch. <u>You must work as fast as you can.</u>
Are you ready? Then start.

Appendix L.3

Subcategories Pre-test *(Click on the word.)*

(Point to the pictures below as you explain what to do.)

In this section you must decide which group the animal must go in. When you are ready, click on the green robot. An animal with its name above the picture will appear. Remember it, and click on it. Decide which of the 6 groups the animal fits best into. Is it the Farm Animals, the Wild Animals, the Birds, the Pets, the Water Animals or the Little Creatures? When you have decided, click on the group you chose. Keep going until you see the red robot.

There will be 6 animal pictures to find, where I can help you to practice what to do. Are you ready? Then start. (*Talk through the 6 examples as they appear.)*

Now I want you to try the next 5 animals all by yourself. I can not help you this time. Think very carefully before you click. Are you ready? Then start.

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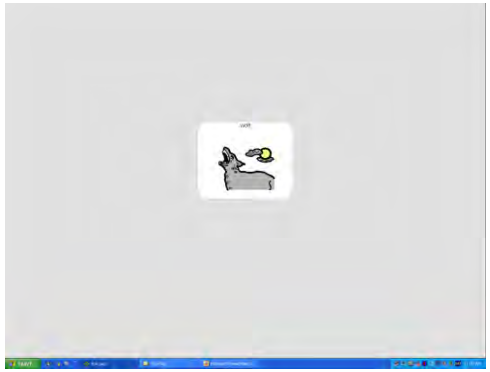
Subcategories Test *(Click on the word.)*

(Point to the pictures below as you explain what to do.)

In this section you must try and find the animal picture in the big picture as quickly as possible. When you are ready, click on the green robot. An animal with its name above the picture will appear. Remember it, and click on it. You will see a big picture of animals. Look for the animal picture, remembering the animal groups as you look. The Farm Animals are this orange group, the Wild Animals are this green group, the Birds this light blue group, the Pets this yellow group, the Water Animals this dark blue group and the Little Creatures this pink group. When you have found the animal, click on it. Keep going until you see the red robot.

There will be 6 animal pictures to find, where I can help you to practice what to do. Are you ready? Then start. *(Talk through the 6 examples as they appear.)*

Now I want you to try the next 36 all by yourself. I can not help you this time. Work as fast as you can, but still be very careful. Are you ready? Then start.

Appendix L.5

Break *(Click on the word.)*

Well done!

You have finished the first half of the program.

I want you to have a rest before you start the next section.

We have got some juice and sweets for you to enjoy while you rest.

Take your paper with you, and keep it safe, because you will need it for the next section again.

(Switch off the voice recorder)

(Take the child to the refreshment area.)

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Administration 2 *(Click on the word.)*

Switch on the voice recorder!

Hello.

What is your name? *(If this is a child not met before.)*

Which side would you like the mouse on? *(Move it to the appropriate side if necessary.)*

Please give me your card. Let me fill in all your information. (*Fill in all the information.)*

You have already done the first section, so you know how this works. We are now going to do something very similar to what you did before, but the pictures are going to be arranged differently.

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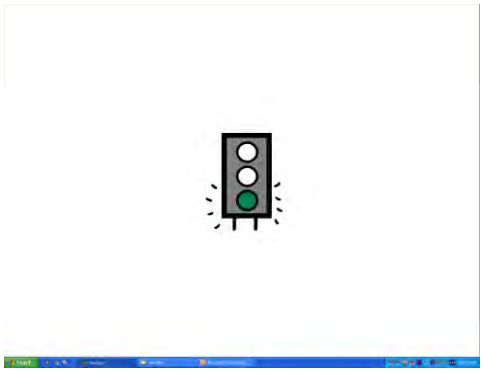
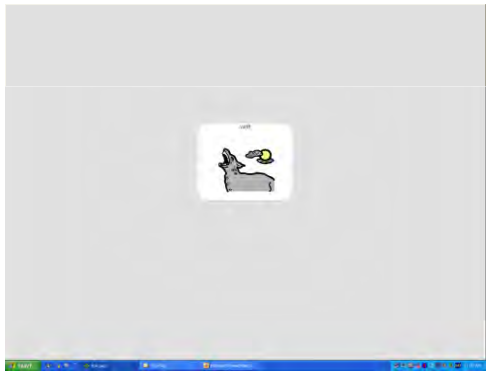
Alphabetic Order Pre-test *(Click on the word.)*

(Point to the pictures below as you explain what to do.)

In this section you must decide which letter the animal starts with. When you are ready, click on the green robot. An animal with its name above the picture will appear. Remember it, and click on it. Decide which of the 26 letters of the alphabet the animal's name starts with and look for that letter in this alphabet. When you have found it, click on it. Keep going until you see the red robot.





There will be 6 animal pictures to find, where I can help you to practice what to do. Are you ready? Then start. (*Talk through the 6 examples as they appear. NB. Remember to say both letter name and sound as you mention the letters!)*

Now I want you to try the next 5 animals all by yourself. I can not help you this time. <u>Think very carefully before you click.</u> Are you ready? Then start.

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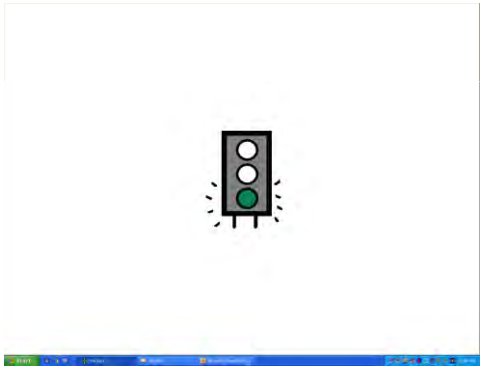
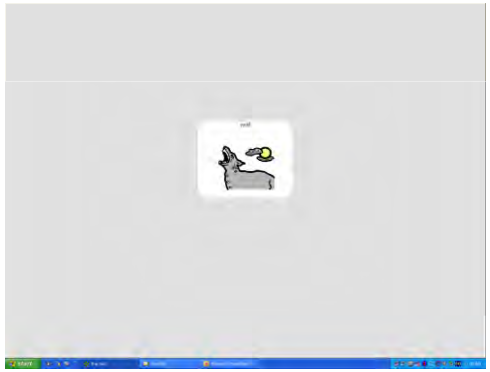
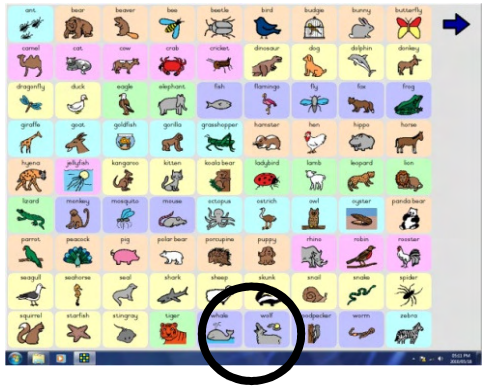
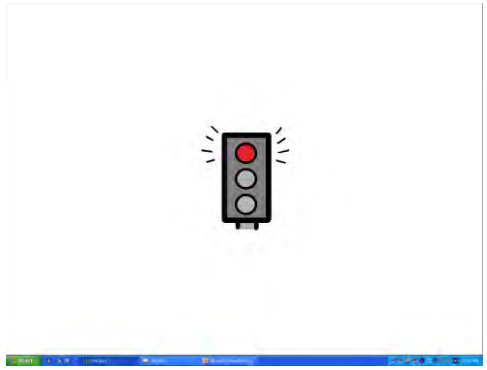
Alphabetic Order Test *(Click on the word.)*

(Point to the pictures below as you explain what to do.)

In this section you must try and find the animal picture in the big picture as quickly as possible. When you are ready, click on the green robot. An animal with its name above the picture will appear. Remember it, and click on it. You will see a big picture of animals. Look for the animal picture. Remember what letter the animal starts with, and then look for the picture in that area of the alphabet . When you have found the animal, click on it. Keep going until you see the red robot.

There will be 6 animal pictures to find, where I can help you to practice what to do. Are you ready? Then start. *(Talk through the 6 examples as they appear. NB. Remember to say both letter name and sound as you mention the letters.)*

Now I want you to try the next 36 all by yourself. I can not help you this time. Work as fast as you can, but still be very careful. Are you ready? Then start.

Close *(Click on the word.)*

Well done! You are completely finished now.

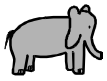
Thank you so very much for helping us.

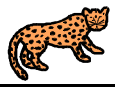
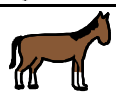
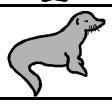
I hope you enjoyed it.

You can go back to class now, but before you go I want to give you a thank you gift.

(Take them to the gift basket and let them chose a pack of cards).

Appendix M: Various ratings of symbols used in the tests

Item No	Animal	Picture	Category	ALP		SUB		Colour	Colour groups (5 groups)	Size (% of area)	Visual Complexity (JPEG)
				Column grouping	Row grouping	Column grouping	Row grouping				
1	cow		Farm Animals	1	1	1	1	brown	3	34.01	6.41
2	mouse		Little Creatures	2	2	3	1	grey	2	34.49	5.91
3	fly		Little Creatures	3	1	3	1	blue / green	4	41.01	5.89
4	budgie		Pets	3	1	1	1	grey	2	43.15	6.40
5	elephant		Wild Animals	2	1	3	1	grey	2	59.64	5.89
6	spider		Little Creatures	3	3	3	1	black +/or white	1	45.38	6.25
7	skunk		Wild Animals	2	3	2	1	black +/or white	1	41.65	5.22
8	octopus		Water Creatures	2	2	1	1	grey	2	53.40	8.69
9	duck		Farm Animals	1	1	1	1	black +/or white	1	24.09	5.01
10	tiger		Wild Animals	2	3	3	1	red	5	66.58	9.28
11	zebra		Wild Animals	3	3	2	1	black +/or white	1	47.04	9.19
12	gorilla		Wild Animals	2	2	2	1	brown	3	35.78	5.61
13	whale		Water Creatures	2	3	2	2	blue / green	4	49.86	6.27
14	ostrich		Birds	2	2	3	2	brown	3	23.80	5.25
15	ladybird		Little Creatures	2	2	3	2	red	5	34.29	6.22
16	starfish		Water Creatures	1	3	1	2	brown	3	38.24	6.32

17	parrot		Birds	1	3	3	2	blue / green	4	37.58	5.47
18	polar bear		Wild Animals	2	3	2	2	black +/or white	1	33.56	4.83
19	bird		Birds	2	1	3	2	blue / green	4	51.42	5.02
20	dragonfly		Little Creatures	1	1	3	2	blue / green	4	22.25	5.73
21	jellyfish		Water Creatures	1	2	2	2	blue / green	4	95.37	8.94
22	dinosaur		Wild Animals	2	1	2	2	brown	3	49.02	6.05
23	fox		Wild Animals	3	1	1	2	brown	3	31.76	5.45
24	cat		Pets	1	1	1	2	grey	2	38.14	6.50
25	kangaroo		Wild Animals	1	2	2	3	brown	3	32.78	6.05
26	owl		Birds	3	2	3	3	brown	3	36.68	6.54
27	goat		Farm Animals	1	2	1	3	brown	3	40.40	6.12
28	leopard		Wild Animals	3	2	1	3	red	5	42.40	9.28
29	horse		Farm Animals	3	2	1	3	brown	3	46.26	5.86
30	stingray		Water Creatures	1	3	2	3	grey	2	34.28	4.13
31	monkey		Wild Animals	1	2	2	3	brown	3	38.55	6.77
32	dog		Pets	3	1	1	3	red	5	40.47	6.39
33	lizard		Little Creatures	1	2	3	3	blue / green	4	31.58	6.61
34	ant		Little Creatures	1	1	3	3	black +/or white	1	31.41	6.33
35	rhinoceros		Wild Animals	3	3	2	3	grey	2	55.96	7.03
36	seal		Water Creatures	1	3	2	3	grey	2	35.89	5.14

Appendix N: Pilot study - problems and solutions

Problem	Solution
1. Administration	
Each participant was given a registration slip detailing his Group Number, Participant Number, Grade and Gender. It was planned for the participants to enter their data into the test program themselves at the beginning of the test, under the supervision of the research assistant. This took time and sometimes resulted in errors that had to be corrected.	Make it the task of the research assistants to enter the information themselves. Each of the participants must have a registration tab with all the relevant information on
It was planned to keep a record of which research assistant worked with each participant, and which of the four computers used for the test program was being used by each of the participants, in order to determine whether there were any significant differences in the participant scores relating to the research assistant or the computer being used. This information was gathered on a form by the research assistant as the participants began the test. However, sometimes the information was omitted.	Integrate the information about which research assistant is officiating and which computer is being used into the log file itself, along with the information relating to the Group, Participant Number, Session, Grade and Gender of the participant. This would prevent dissociation of participant information from data. Improve the instruction of the research assistants through a formal instruction session.
The pilot study used 12 children and took place at one end of a large church hall. After the group instruction session, four children were assigned to the four computers, and their positions were refilled as soon as computers became available. The children who were not being tested at that time proved a significant distraction to the children working on the computers. Although eats and drinks had been provided for the children for the period when they were not involved in the testing, there was not sufficient planning as to how the children who were not being tested would be kept busy.	While children are waiting their turns, and during the refreshment break, they must be supervised outside the testing room.
Another problem that the above method would present in the main study was the staggering of the children's arrival at the testing station. Staggered leaving from and return to the classrooms would be disruptive to teachers and also logistically difficult to manage.	It was considered a more efficient and less disruptive approach to have the children leave their classrooms to come to the test situation in groups of four and to be returned to their classrooms in these same groups once all four had finished with their tests.

Problem	Solution
2. Participant instruction program	
The instruction program appeared understandable, adequate and engaging by the full range of children. Some children took longer than the others to execute the commands to circle symbols and join items with their pencils.	To ensure an efficient execution of the instruction program, without proceeding too fast for the slower children, or too slow for the majority of the children, adult support would be maximized. All four research assistants would be required to be present at each group instruction session to facilitate full understanding of the test instructions by all the children. The teachers would also be requested to facilitate in the supervision of the children to maximize control of the group.
After each section of the paper-based instruction, the children were shown on a computer screen what the test program would look like. The observer's comment was that this may be disruptive, and that the computer program could be shown at the end of the instruction.	The computer version of the program will be shown at the end of the paper-based instruction.

Problem	Solution
3. Test program	
It seemed that the Alphabetic Order Test was perhaps more difficult for the younger children than the Subcategories Test. It took longer and appeared to tire these children. The total testing time became unacceptably long. Ways to reduce it would have to be found to reduce frustration by ensuring that the testing procedure would not take too long.	The test design was for 4 full trials of the test – an initial trial and 3 repeats. Reflection after the pilot study led to the decision to contain the main study to an investigation of first exposure response only, and to remove all repeat trials. The number of test items for each test would therefore reduce from 72 to 18 items. Such a major reduction of the number of test items allowed for the addition of test items to the first exposure trial. It was decided to present 36 items in each test of the main study.
The research assistants were unclear about what to do when children could not find the target symbol and spent very long periods looking for the symbol.	The problem of too long location times would be addressed in the instruction programs, for both the participants and the research assistants. The participants would be urged to click on the 'Forwards' arrow (or 'Escape' option) if they couldn't find a target or forgot what target they were looking for. Research assistants would be instructed on when to suggest using the 'Forwards' arrow. An additional factor that would significantly reduce long search was that there would no longer be repeat chances at locating a symbol – the first selection would automatically result in the test program continuing.
The biggest problem resulting from the long times taken on the alphabet test by the younger children was that an on-the-spot decision had to be made to only do one test per child at this pilot trial. The data collected was therefore incomplete.	Addressing the long location times (see above) would reduce the problem of long testing times.
Memory lapses caused problems such as • Forgetting what is being searched for and remaining passive • Forgetting what is being searched for and making multiple clicks across the screen in an attempt to find it • Perseverating on a symbol, convinced that it is the target symbol, rather than moving forward	These errors will be controlled for through • Instruction • Designing the test program so that all mouse clicks will result in the program continuing automatically. Multiple errors on the same symbol will no longer be possible. The participants will also be urged to refrain from guessing, but to rather use the forward arrow should they forget what they are searching for.

The criterion for passing the pre-tests was a score of 5 out of 5 (100%). However, the participant who failed the SUB Pre-test went on to perform successfully in the SUB Test, dropping from 208 sec to 45 sec in location times from the beginning of the test to the 3rd practice round. The participant who failed the ALP Pre-test 1 went on to cope with the demands of the ALP Test.	The performance of these two participants indicated that the criterion of passing the pre-tests with no errors may be too strict. The criterion was changed to 4 out of 5 (80%).
It appeared that ALP Pre-test 2 was significantly more difficult than ALP Pre-test 1 and took much longer to complete. Two Grade 1 children failed this test, and there was a large variation in time taken across the group to complete the test – from 32 sec to 141 sec.	To restrict time demands on the total time for test administration, ALP Pre-test 2 was removed from the test procedure. ALP Pre-test 1 was designed for selection criteria purposes whereas ALP Pre-test 2 was designed for descriptive purposes only.
Some of the participants had unstable left click movements. They would sometimes press the right mouse button by mistake. In The Grid 1™ (The Grid, 2002), a right click brings up the editing menu. The window would have to be closed by clicking on 'Cancel'. Not only did this waste time, it also confused the children and research assistants.	In The Grid 1™ program (The Grid, 2002), a default setting causes the editing menu to be activated by a right click. However, this feature can be deactivated in the 'User Settings' and will be accessed for the main study. On an accidental right click, there will be no response from the program.
Speed errors were noted, such as • Selecting a symbol adjacent to the target symbol • Clicking on the white space around the target symbol in the grid presenting the target symbol	Instruction will emphasize the need to work carefully and accurately.

Problem	Solution
4. Data capture and log file creation	
An unforeseen problem was the dissociation of the first part of the logged information from the second part. The first part of the logged information of the test held the group number, participant number, grade and gender of the participant. At the end of the first test, the participant had a break and exited the program, closing the log file. Another participant then executed his first test, opening a new log file. When the first participant began his second test, there was no information in the log file linking that participant to his data.	All the participant's identifying information would have to be entered at the beginning of the test procedure, and re-entered at the beginning of the second test. Detailed paper records would also be kept, which would provide a useful backup and cross-check mechanism. The paper record would include the time the test started, serving as a direct link between the participant and his log file.
On analysing the data in the log file, it became apparent that managing errors would statistically be a problem.	The opportunity to make multiple clicks on the same symbol will be removed from the program. This will simplify the log file created during testing.

Problem	Solution
5. Research assistant instruction	
The research assistants were not as experienced with the test program as they could have been and were not fully competent at handling queries as they presented. Consequently, they addressed a number of queries to the main researcher.	The research assistants should be instructed more thoroughly, with hands-on experience of working through the program and possible problem areas. They would be provided with a structured script to work through during test administration.

Appendix O: Pilot study data

Participant information					ALP Pre-tests				ALP Test								SUB Pre-test		SUB Test							
Participant Number	Group	Grade	Gender	Mouse Control Screening	ALP Pre-test 1 time (secs)	ALP Pre-test 1 errors	ALP Pre-test 2 time (secs)	ALP Pre-test 2 errors	ALP Test - 1st exposure time (secs)	ALP Test - 1st exposure errors	ALP Test - 1st repeat time (secs)	ALP Test - 1st repeat errors	ALP Test - 2nd repeat time (secs)	ALP Test - 2nd repeat errors	ALP Test - 3rd repeat time (secs)	ALP Test - 3rd repeat errors	SUB Pre-test time (secs)	SUB Pre-test errors	SUB Test - 1st exposure time (secs)	SUB Test - 1st exposure errors	SUB Test - 1st repeat time (secs)	SUB Test - 1st exposure errors	SUB Test - 2nd repeat time (secs)	SUB Test - 2nd repeat errors	SUB Test - 3rd repeat time (secs)	SUB Test - 3rd repeat errors
23	A	0	F	79													39	5	192	2	93	1	128	4	119	2
2	A	0	M	85													26	5	181	3	64	1	90	12	76	6
7	A	1	F	54													22	5	123	3	70	0	56	1	62	0
8	B	1	F	60	17	5	141	1	196	1	134	0	110	0	86	0										
13	A	1	F	38													19	5	108	0	48	1	60	13	42	0
17	A	1	F	54													31	5	146	11	76	7	108	7	98	11
4	A	1	M	40													56	2	208	10	50	0	41	1	45	0
19	B	1	M	115	25	5	90	1	391	2																
21	B	1	M	36	10	4	135	5	187	1	93	0	101	0												
22	B	2	F	54	10	5	32	5	196	0	106	1	92	25	56	0										
15	A	3	F	54													23	5	111	1	48	1	69	2	66	3
14	B	3	M	37	22	5	72	5	157	0	77	0	76	1	48	0										
				59	17		94		225		103		95		63		31		153		64		79		73	

Note: Red numbers - Pre-test score failures

Note: Pre-test 2 was removed after pilot study

Appendix P: Ethical clearance

University of Pretoria

Research Proposal and Ethics Committee
Faculty of Humanities

15 January 2008

Dear Professor Alant

Project:	**The comparison of the effect of two visual display strategies – sub-categorisation and alphabetical order – on the speed of location of symbols in a large visual display for children aged 7 to 9 years**
Researcher:	**MP Herold**
Supervisor:	**Prof. E Alant**
Department:	**Centre for Augmentative and Alternative Communication**
Reference number:	**20240245**

Thank you for your response to the Committee's letter of 13 July 2007.

I have pleasure in informing you that the Research Proposal and Ethics Committee formally approved the above study at an *ad hoc* meeting held on 14 January 2008. The approval is subject to the candidate abiding by the principles and parameters set out in her application and research proposal in the actual execution of the research.

The Committee requests you to convey this approval to Ms. Herold.

We wish you success with the project.

Sincerely

Brenda Louw

Prof. Brenda Louw
Chair: Research Proposal and Ethics Committee
Faculty of Humanities
UNIVERSITY OF PRETORIA

Note: Minor changes were made to the title after Ethical Clearance was granted.

Appendix Q: Teacher's form - participant selection criteria

Teacher						
Grade						
Parent Permission	Gender	Number	Child's Name		Does the child show difficulty with independent completion of school tasks demanding concentration of less than 10 mins?	Does the child have any other specific sensory difficulties, such as uncorrected hearing or uncorrected vision?
		1				
		2				
		3				
		4				
		5				
		6				
		7				
		8				
		9				
		10				
		11				
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				
		21				
		22				
		23				
		24				

Appendix R: Participant numbers and groups

Number available per grade	Number available per grade per gender	Parent permission granted	Not disqualified from sample	Grade	Gender	Age	Group	Participant number	Comment
		1	0	1	F				
		1	0	1	F				
		1	0	1	M				
		1	0	1	M				
		1	0	1	M				
		1	0	1	M				
		1	0	2	F				
		1	0	2	F				
		1	0	2	F				Teacher-rated selection criteria failure
		1	0	2	M				
		1	0	2	M				
		1	0	3	F				
		1	0	3	M				
		1	0	3	M				
		1	0	3	M				
		1	0	3	M				
		1	0	3	M				
1	1	1	1	1	F	7-05	A	1	
2	2	1	0	1	F	7-03	B	2	SUB Pre-test failure
3	3	1	1	1	F	7-03	A	3	
4	4	1	1	1	F	7-02	B	4	
5	5	1	1	1	F	7-02	A	5	
6	6	1	1	1	F	7-01	B	6	
7	7	1	0	1	F	7-01	A	7	SUB Pre-test failure
8	8	1	1	1	F	7-01	B	8	
9	9	1	1	1	F	7-01	A	9	
10	10	1	1	1	F	7-01	B	10	
11	11	1	1	1	F	7-00	A	11	
12	12	1	1	1	F	7-00	B	12	
13	13	1	1	1	F	6-11	A	13	
14	14	1	1	1	F	6-10	B	14	
15	15	1	1	1	F	6-10	A	15	
16	16	1	1	1	F	6-10	B	16	

Number available per grade	Number available per grade per gender	Parent permission granted	Not disqualified from sample	Grade	Gender	Age	Group	Participant number	Comment
17	17	1	1	1	F	6-10	A	17	
18	18	1	1	1	F	6-10	B	18	
19	19	1	1	1	F	6-08	A	19	
20	20	1	1	1	F	6-08	B	20	
21	21	1	1	1	F	6-07	A	21	
22	22	1	1	1	F	6-05	B	22	
23	1	1	1	1	M	8-08	A	23	
24	2	1	1	1	M	7-09	B	24	
25	3	1	1	1	M	7-09	A	25	
26	4	1	1	1	M	7-08	B	26	
27	5	1	1	1	M	7-05	A	27	
28	6	1	1	1	M	7-05	B	28	
29	7	1	1	1	M	7-05	A	29	
30	8	1	1	1	M	7-04	B	30	
31	9	1	1	1	M	7-04	A	31	
32	10	1	1	1	M	7-04	B	32	
33	11	1	1	1	M	7-02	A	33	
34	12	1	1	1	M	7-02	B	34	
35	13	1	1	1	M	7-01	A	35	
36	14	1	1	1	M	7-01	B	36	
37	15	1	1	1	M	7-00	A	37	
38	16	1	1	1	M	7-00	B	38	
39	17	1	1	1	M	6-11	A	39	
40	18	1	1	1	M	6-10	B	40	
41	19	1	1	1	M	6-10	A	41	
42	20	1	1	1	M	6-10	B	42	
43	21	1	1	1	M	6-10	A	43	
44	22	1	1	1	M	6-08	B	44	
45	23	1	1	1	M	6-07	A	45	
1	1	1	0	2	F	9-00	B	46	ALP not completed
2	2	1	0	2	F	8-05	A	47	SUB tested twice, ALP not tested
3	3	1	1	2	F	8-05	B	48	
4	4	1	1	2	F	8-04	A	49	
5	5	1	1	2	F	8-03	B	50	
6	6	1	1	2	F	8-03	A	51	

Number available per grade	Number available per grade per gender	Parent permission granted	Not disqualified from sample	Grade	Gender	Age	Group	Participant number	Comment
7	7	1	1	2	F	8-02	B	52	
8	8	1	1	2	F	8-02	A	53	
9	9	1	1	2	F	8-01	B	54	
10	10	1	1	2	F	8-01	A	55	
11	11	1	1	2	F	7-11	B	56	
12	12	1	1	2	F	7-10	A	57	
13	13	1	1	2	F	7-07	B	58	
14	14	1	1	2	F	7-05	A	59	
15	1	1	1	2	M	9-03	B	60	
16	2	1	1	2	M	8-11	A	61	Participant 63 was initially incorrectly recorded as male. Participants were divided into groups on that basis. The gender numbers were corrected for in all analyses, but it did impact minimally on the A-B and Male-Female grouping numbers. Table 5 holds the corrected numbers.
17	3	1	1	2	M	8-08	B	62	
18	4	1	1	2	M	8-08	A	63	
19	5	1	1	2	M	8-06	B	64	
20	6	1	1	2	M	8-05	A	65	
21	7	1	1	2	M	8-04	B	66	
22	8	1	1	2	M	8-04	A	67	
23	9	1	1	2	M	8-04	B	68	
24	10	1	1	2	M	8-03	A	69	
25	11	1	1	2	M	8-02	B	70	
26	12	1	1	2	M	8-02	A	71	
27	13	1	1	2	M	8-02	B	72	
28	14	1	1	2	M	8-01	A	73	
29	15	1	1	2	M	8-00	B	74	
30	16	1	1	2	M	8-00	A	75	
31	17	1	1	2	M	7-11	B	76	
32	18	1	1	2	M	7-10	A	77	
33	19	1	1	2	M	7-08	B	78	
34	20	1	1	2	M	7-07	A	79	
35	21	1	1	2	M	7-07	B	80	
1	1	1	1	3	F	9-05	A	81	
2	2	1	1	3	F	9-05	B	82	
3	3	1	1	3	F	9-04	A	83	
4	4	1	1	3	F	9-04	B	84	
5	5	1	1	3	F	9-04	A	85	
6	6	1	1	3	F	9-04	B	86	

Number available per grade	Number available per grade per gender	Parent permission granted	Not disqualified from sample	Grade	Gender	Age	Group	Participant number	Comment
7	7	1	1	3	F	9-03	A	87	
8	8	1	1	3	F	9-03	B	88	
9	9	1	1	3	F	9-02	A	89	
10	10	1	1	3	F	9-02	B	90	
11	11	1	1	3	F	9-02	A	91	
12	12	1	1	3	F	9-01	B	92	
13	13	1	1	3	F	9-00	A	93	
14	14	1	1	3	F	8-11	B	94	
15	15	1	1	3	F	8-08	A	95	
16	16	1	1	3	F	8-07	B	96	
17	17	1	1	3	F	8-07	A	97	
18	18	1	1	3	F	8-06	B	98	
19	1	1	1	3	M	9-05	A	99	
20	2	1	1	3	M	9-05	B	100	
21	3	1	1	3	M	9-04	A	101	
22	4	1	1	3	M	9-04	B	102	
23	5	1	1	3	M	9-03	A	103	
24	6	1	1	3	M	9-03	B	104	
25	7	1	1	3	M	9-02	A	105	
26	8	1	0	3	M	9-01	B	106	SUB tested twice, ALP not tested
27	9	1	1	3	M	9-00	A	107	
28	10	1	1	3	M	9-00	B	108	
29	11	1	1	3	M	9-00	A	109	
30	12	1	1	3	M	8-11	B	110	
31	13	1	1	3	M	8-09	A	111	
32	14	1	1	3	M	8-09	B	112	
33	15	1	1	3	M	8-09	A	113	
34	16	1	1	3	M	8-02	B	114	
		131	109						

Appendix S: Example of registration slip

For administrative purposes a registration slip was used for each participant. It provided a means to cross-check the participant information records with the logged information.

Name	John Smith	
Participant number	26	
Group	B	
Grade	1	
Gender	Male	
Research assistant number	Session 1 2	Session 2 2
Computer number	Session 1 4	Session 2 4
Time started	Session 1 9:32	Session 2 10:04
General comments and observations	Searched from top-to-bottom in ALP instead of left-to-right	

Red information Example of information filled in by researcher before testing

Blue information Example of information filled in by research assistants during testing

Appendix T: Processing of log files

First step of processing

Log files created from each testing event were gathered from the four computers, with a copy made for external storage of the original, unaltered data. See below for an example of an unaltered log file.

T:10:53:59 O:"" P:"CONTROL.CHANGEUSER.VSR Grid Set"

T:10:54:03 O:"" P:"CONTROL.NAVIGATE"

T:10:54:05 O:"" P:"CONTROL.NAVIGATE"

T:10:54:13 B:"1,2" G:"Grp A-B"

T:10:54:13 O:"" P:"CONTROL.NAVIGATE"

T:10:54:16 B:"1,1" G:"Grp A"

T:10:54:16 O:"" P:"CONTROL.NAVIGATE"

T:10:54:26 B:"2,3" G:"Num A"

T:10:54:26 O:"7" P:"TEXT"

T:10:54:33 B:"5,6" G:"Key A"

T:10:54:33 O:"" P:"CONTROL.NAVIGATE"

T:10:54:39 B:"2,1" G:"Grd A"

T:10:54:39 O:"Grd 1 " P:"TEXT"

T:10:54:46 B:"5,5" G:"Grd A"

T:10:54:46 O:"" P:"CONTROL.CHANGEUSER.VSR Grid Set"

T:10:54:47 O:"" P:"CONTROL.NAVIGATE"

T:10:54:51 B:"1,2" G:"Grp A-B"

T:10:54:52 O:"" P:"CONTROL.NAVIGATE"

T:10:54:56 B:"1,2" G:"Grp A"

T:10:54:56 O:"" P:"CONTROL.CHANGEUSER.VSR Mouse Screening"

T:10:54:57 O:"" P:"CONTROL.NAVIGATE"

T:10:55:05 B:"1,1" G:"1 Mou Scr Ins"

T:10:55:06 O:"" P:"CONTROL.NAVIGATE"

T:10:55:15 B:"2,2" G:"1 Mou Scr Go"

T:10:55:15 O:"" P:"CONTROL.NAVIGATE"

Second step of processing

The log files were processed to remove all information not required for this study. All information pertaining to access routes to the various tasks, instruction grids and rows with the words CONTROL NAVIGATE (these merely indicated that there had been a change in the grids) were removed. Below is an example of how the original log file was prepared to look after this step of processing.

T:10:55:31 B:"7,4" G:"1 Mou Scr 06"

T:10:55:33 B:"10,7" G:"1 Mou Scr 07"

T:10:55:37 B:"2,2" G:"1 Mou Scr 08"

T:10:55:39 B:"5,5" G:"1 Mou Scr 09"

T:10:55:42 B:"8,9" G:"1 Mou Scr 10"

T:10:55:43 B:"8,9" G:"1 Mou Scr 11"

T:10:55:45 B:"1,7" G:"1 Mou Scr 11"

T:10:55:48 B:"7,2" G:"1 Mou Scr 12"

T:10:55:50 B:"8,7" G:"1 Mou Scr 13"

T:10:55:53 B:"4,9" G:"1 Mou Scr 14"

T:10:55:55 B:"10,4" G:"1 Mou Scr 15"

T:10:55:59 B:"4,3" G:"1 Mou Scr 16"

T:10:56:01 B:"10,1" G:"1 Mou Scr 17"

T:10:56:04 B:"5,8" G:"1 Mou Scr 18"

T:10:56:07 B:"9,5" G:"1 Mou Scr 19"

T:10:56:09 B:"3,5" G:"1 Mou Scr 20"

T:10:56:58 B:"5,4" G:"1 Sub Pre 01 A"

T:10:57:05 B:"5,2" G:"1 Sub Pre 01 B"

T:10:57:09 B:"5,4" G:"1 Sub Pre 02 A"

T:10:57:12 B:"8,5" G:"1 Sub Pre 02 B"

T:10:57:16 B:"5,4" G:"1 Sub Pre 03 A"

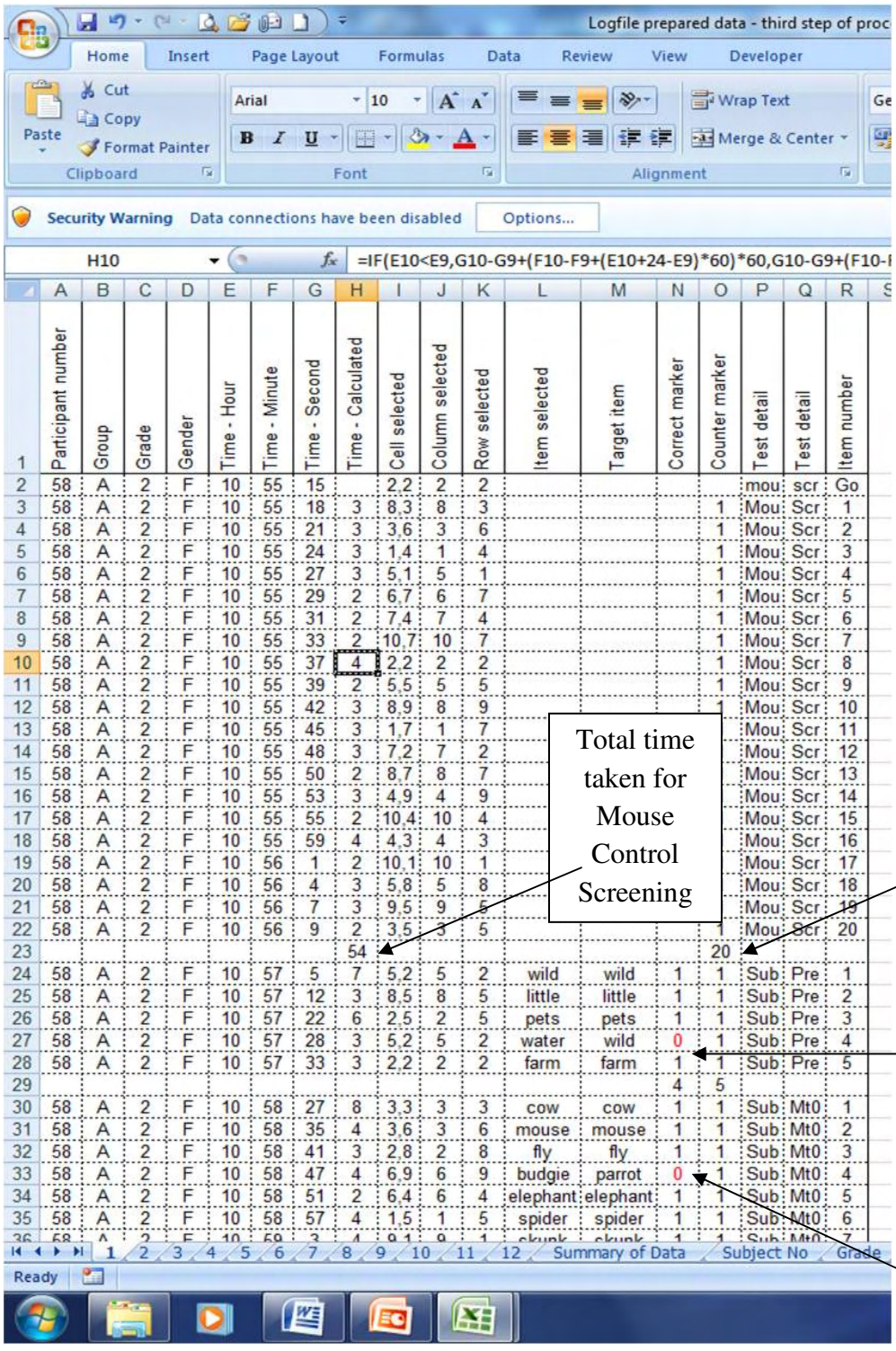
T:10:57:22 B:"2,5" G:"1 Sub Pre 03 B"

Third step of processing

The data was now ready to transfer into and Excel spreadsheet for further processing. Through Excel's import function, the data could be imported in a manner that could separate the various elements of the information into columns. With Excel's macro function, macros were created to further remove excess information, calculate the time taken for selections and add columns to hold other calculated information (such as correct/incorrect selections and symbols chosen). Below is an example of a resultant spreadsheet.

A control for accidental erasure of a line of information was embedded in the '1' in front of the test name e.g. 1 Mou Scr or 1 Sub Pre. The '1's would be summed during processing to ensure that the correct number of lines was represented. Any errors noted would be investigated in the original data.

The pre-tests were marked manually. If the participant failed to achieve 4 correct selections out of 5 in the pre-test, his data was not included in the final data bank.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Participant number	Group	Grade	Gender	Time - Hour	Time - Minute	Time - Second	Time - Calculated	Cell selected	Column selected	Row selected	Item selected	Target item	Correct marker	Counter marker	Test detail	Test detail	Item number
2	58	A	2	F	10	55	15		2,2	2	2					mou	scr	Go
3	58	A	2	F	10	55	18	3	8,3	8	3				1	Mou	Scr	1
4	58	A	2	F	10	55	21	3	3,6	3	6				1	Mou	Scr	2
5	58	A	2	F	10	55	24	3	1,4	1	4				1	Mou	Scr	3
6	58	A	2	F	10	55	27	3	5,1	5	1				1	Mou	Scr	4
7	58	A	2	F	10	55	29	2	6,7	6	7				1	Mou	Scr	5
8	58	A	2	F	10	55	31	2	7,4	7	4				1	Mou	Scr	6
9	58	A	2	F	10	55	33	2	10,7	10	7				1	Mou	Scr	7
10	58	A	2	F	10	55	37	4	2,2	2	2				1	Mou	Scr	8
11	58	A	2	F	10	55	39	2	5,5	5	5				1	Mou	Scr	9
12	58	A	2	F	10	55	42	3	8,9	8	9				1	Mou	Scr	10
13	58	A	2	F	10	55	45	3	1,7	1	7					Mou	Scr	11
14	58	A	2	F	10	55	48	3	7,2	7	2					Mou	Scr	12
15	58	A	2	F	10	55	50	2	8,7	8	7					Mou	Scr	13
16	58	A	2	F	10	55	53	3	4,9	4	9					Mou	Scr	14
17	58	A	2	F	10	55	55	2	10,4	10	4					Mou	Scr	15
18	58	A	2	F	10	55	59	4	4,3	4	3					Mou	Scr	16
19	58	A	2	F	10	56	1	2	10,1	10	1					Mou	Scr	17
20	58	A	2	F	10	56	4	3	5,8	5	8					Mou	Scr	18
21	58	A	2	F	10	56	7	3	9,5	9	5					Mou	Scr	19
22	58	A	2	F	10	56	9	2	3,5	3	5				1	Mou	Scr	20
23								54							20			
24	58	A	2	F	10	57	5	7	5,2	5	2	wild	wild	1	1	Sub	Pre	1
25	58	A	2	F	10	57	12	3	8,5	8	5	little	little	1	1	Sub	Pre	2
26	58	A	2	F	10	57	22	6	2,5	2	5	pets	pets	1	1	Sub	Pre	3
27	58	A	2	F	10	57	28	3	5,2	5	2	water	wild	0	1	Sub	Pre	4
28	58	A	2	F	10	57	33	3	2,2	2	2	farm	farm	1	1	Sub	Pre	5
29														4	5			
30	58	A	2	F	10	58	27	8	3,3	3	3	cow	cow	1	1	Sub	Mt0	1
31	58	A	2	F	10	58	35	4	3,6	3	6	mouse	mouse	1	1	Sub	Mt0	2
32	58	A	2	F	10	58	41	3	2,8	2	8	fly	fly	1	1	Sub	Mt0	3
33	58	A	2	F	10	58	47	4	6,9	6	9	budgie	parrot	0	1	Sub	Mt0	4
34	58	A	2	F	10	58	51	2	6,4	6	4	elephant	elephant	1	1	Sub	Mt0	5
35	58	A	2	F	10	58	57	4	1,5	1	5	spider	spider	1	1	Sub	Mt0	6
36	58	A	2	F	10	59	3	4	9,1	9	1	skunk	skunk	1	1	Sub	Mt0	7

Fourth step of processing

The next step of data preparation was to collect all the data files for each participant into a master spreadsheet and prepare it in a format suitable for the statistician.

Appendix U: Procedural integrity check for particpant instruction

Scoring criteria

0 - Section omitted 1 - Section executed

Comments

Any deviation from protocol as presented in instruction manual
Any imbalance in style and time taken between sections
Any other observations that may be relevant

Section	No.	Subsection	Time (30	Rater 1 Grd 1	Rater 1 Grd 2	Rater 1 Grd 3	Rater 2 Grd 1	Rater 2 Grd 2	Rater 2 Grd 3
Introduction	1	Introduce self and study	2	1	1	1	1	1	1
	2	Assent requested		1	1	1	1	1	1
	3	Forms filled in		1	1	1	1	1	1
Concept of subcategories	4	Concept explained	6	1	1	1	1	1	1
	5	3 demo examples		1	1	1	1	1	1
	6	6 practice examples		1	1	1	1	1	1
Using subcategories to locate symbols in display	7	Concept explained	6	1	1	1	1	1	1
	8	3 demo examples		1	1	1	1	1	1
	9	6 practice examples		1	1	1	1	1	1
Concept of initial phonic of words	10	Concept explained	5	1	1	1	1	1	1
	11	3 demo examples		1	1	1	1	1	1
	12	6 practice examples		1	1	1	1	1	1
Using alphabetic order to locate symbols in display	13	Concept explained	6	1	1	1	1	1	1
	14	3 demo examples		1	1	1	1	1	1
	15	6 practice examples		1	1	1	1	1	1
Subcategories computer pre-test	16	Concept explained	4	1	1	1	1	1	1
	17	3 demo examples		1	1	1	1	1	1
Subcategories computer main test	18	Concept explained		1	1	1	1	1	1
	19	3 demo examples		1	1	1	1	1	1
Alphabetic Order computer pre-test	20	Concept explained		1	1	1	1	1	1
	21	3 demo examples		1	1	1	1	1	1
Alphabetic Order computer main test	22	Concept explained		1	1	1	1	1	1
	23	3 demo examples		1	1	1	1	1	1
Closing	24	Thank you	1	1	1	1	1	1	1
	25	Gift given		1	1	1	1	1	1
		Total score		25	25	25	25	25	25
		Total percentage		100	100	100	100	100	100

Rater comments	Rater 1	Grd 2: Class slightly disruptive but well handled.
		Grd 2: Not all the children could see the PC screen.
	Rater 2	General: Three omissions of question "Do you have any questions?" after concept was explained and practice opportunity was given, and one omission of drawing attention to escape arrow.

Appendix V: Procedural integrity for testing - by participant

No of sessions rated	Participant number	Group	Session	Test	Grade	Gender	Ses 1			Ses 2		Unauthorised assistance
							Sections executed - Max 12	% correctly scored	Unauthorised assitance	Sections executed - Max 9	% correctly scored	
1	6	B	1	ALP	1	F	12	100.00	0			
1	17	A	1	SUB	1	F	11	91.67	0			
1	19	A	1	SUB	1	F	12	100.00	0			
1	21	A	1	SUB	1	F	12	100.00	0			
1	28	B	1	ALP	1	M	12	100.00	0			
1	34	B	1	ALP	1	M	12	100.00	0			
1	56	B	1	ALP	2	F	11	91.67	0			
1	57	A	1	SUB	2	F	11	91.67	0			
1	59	A	1	SUB	2	F	12	100.00	1			
1	66	B	1	ALP	2	M	11	91.67	0			
1	67	A	1	SUB	2	M	12	100.00	0			
1	68	B	1	ALP	2	M	12	100.00	0			
1	72	B	1	ALP	2	M	11	91.67	0			
1	76	B	1	ALP	2	M	12	100.00	0			
1	85	A	1	SUB	3	F	11	91.67	0			
1	86	B	1	ALP	3	F	12	100.00	0			
1	95	A	1	SUB	3	F	12	100.00	0			
1	98	B	1	ALP	3	F	11	91.67	0			
1	101	A	1	SUB	3	M	12	100.00	0			
1	1	A	2	ALP	1	F				8	88.89	0
1	10	B	2	SUB	1	F				8	88.89	0
1	11	A	2	ALP	1	F				8	88.89	0
1	20	B	2	SUB	1	F				8	88.89	0
1	21	A	2	ALP	1	F				8	88.89	0
1	22	B	2	SUB	1	F				8	88.89	0
1	24	B	2	SUB	1	M				8	88.89	0
1	26	B	2	SUB	1	M				9	100.00	0
1	39	A	2	ALP	1	M				9	100.00	0
1	60	B	2	SUB	2	M				9	100.00	0
1	68	B	2	SUB	2	M				8	88.89	0
1	75	A	2	ALP	2	M				8	88.89	0
1	79	A	2	ALP	2	M				8	88.89	0
1	82	B	2	SUB	3	F				8	88.89	0
1	91	A	2	ALP	3	F				8	88.89	0
1	94	B	2	SUB	3	F				8	88.89	0
1	95	A	2	ALP	3	F				8	88.89	0
1	97	A	2	ALP	3	F				8	88.89	0
37							Ave	96.93		Ave	90.74	
							Total average		93.84			

Procedural integrity for testing - by section

Scoring criteria

Procedure: 0 - Section omitted 1 - Section correctly executed

Indication of unauthorised assistance: Score 1 for every occurence

Comments

Any deviation from protocol as presented in procedure manual, integrity of sound file or any other observation that may be relevant.

Section	No.	Subsection	Score			Researcher comments on procedural integrity errors.
			% correct execution		Unauthorised assistance	
			Session 1	Session 2		
Introduction	1	Greeting given	89.47			Recording only began after greeting.
	2	Mouse position determined	73.68			It may be that the participants reached for the mouse before the research assistant formally asked which side they wanted it on.
	3	Rules explained	100.00			
Mouse Screening	4	Description of task	100.00			
	5	"Work as fast as you can"	100.00			
First Pretest	6	Description of task	100.00			
	7	6 demo symbols covered	100.00			
	8	5 test symbols executed	100.00			
First Test	9	Description of task	100.00			It occurred once during a SUB Test that an assitant said "A fly is a small creature" in response to a child's question about the fly.
	10	6 demo symbols covered	100.00			
	11	36 test symbols executed	100.00		1	
Break	12	Sent for refresments	100.00			
	13	10 mins between sessions		100.00		
Introduction	14	Mouse position determined		16.67		It may be that in the second session, the participants were familiar with the task and reached for the mouse on their own, without it having to be discussed formally.
Second Pretest	15	Description of task		100.00		
	16	6 demo symbols covered		100.00		
	17	5 test symbols executed		100.00		
Second Test	18	Description of task		100.00		
	19	6 demo symbols covered		100.00		
	20	36 test symbols executed		100.00		
Closing	21	Thank you + gift given		100.00		
		Total	96.93	90.74		
		Average	93.84			

Rater Comments	Instructions for the test tended to be paraphrased. Instructions such as 'Work fast but be careful' and 'Think carefully' were often paraphrased to 'As fast as you can' or 'Look carefully' or even 'Now do it all by yourself'.'
Researcher Comments	Instructions were highly scripted but not designed to be read verbatim. The omission by the research assistants to present the prompts concerning working fast but carefully, or to think carefully, was unfortunate, and represents a weakness in the procedural integrity of this study.

Appendix W: Summary of all data collected

Grade	Gender	Number of participants	Mean mouse screening score	Failed ALP Pre-test	Mean ALP Time	Mean ALP Score	Total forward selections in ALP	Total error selections in ALP	Failed SUB Pre-test	Mean SUB Time	Mean SUB Score	Total forward selections in SUB	Total error selections in SUB	Mean ALP-SUB Time Difference	Mean ALP-SUB Score Difference	Mean ALP Item Time	Mean ALP Item Score	Mean SUB Item Time	Mean SUB Item Score
1	F	20	47.40	0	412.00	29.05	98	41	2	208.45	32.65	38	29	203.55	-3.60	11.44	0.81	5.79	0.91
1	M	23	49.30	0	451.52	28.78	104	62	0	221.61	32.83	28	45	229.91	-4.04	12.54	0.80	6.16	0.91
1	All	43	48.42	0	433.14	28.91	202	103	0	215.49	32.74	66	74	217.65	-3.84	12.03	0.80	5.99	0.91
2	F	12	38.42	0	284.33	33.08	8	27	0	166.25	34.42	8	11	118.08	-1.33	7.90	0.92	4.62	0.96
2	M	21	37.95	0	347.76	31.19	60	41	0	168.71	33.48	20	33	179.05	-2.29	9.66	0.87	4.69	0.93
2	All	33	38.12	0	324.70	31.88	68	68	0	167.82	33.82	28	44	156.88	-1.94	9.02	0.89	4.66	0.94
3	F	18	34.22	0	214.61	34.06	18	17	0	141.50	34.67	10	14	73.11	-0.61	5.96	0.95	3.93	0.96
3	M	15	34.60	0	238.13	34.00	14	16	0	157.00	34.60	5	16	81.13	-0.60	6.61	0.94	4.36	0.96
3	All	33	34.39	0	225.30	34.03	32	33	0	148.55	34.64	15	30	76.76	-0.61	6.26	0.95	4.13	0.96
		Total	Average	Total	Average	Average	Total	Total	Total	Average	Average	Total	Total	Average	Average	Average	Average	Average	Average
		109	41.06	0	337.39	31.36	302	204	2	180.79	33.64	109	148	156.60	-2.28	9.37	0.87	5.02	0.93

Appendix X: Participant data

Grade	Participant Number	ALP								SUB								ALP-SUB Diff	
		Time				Score				Time				Score				Time	Score
		Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max		
1	1	10.08	9.93	1	40	0.81	0.40	0	1	5.78	6.37	1	33	0.92	0.28	0	1	4.31	-0.11
1	3	9.56	6.32	2	28	0.86	0.35	0	1	6.61	3.48	2	17	0.97	0.17	0	1	2.94	-0.11
1	4	11.31	10.74	2	38	0.86	0.35	0	1	5.69	5.82	2	31	0.94	0.23	0	1	5.61	-0.08
1	5	13.58	13.17	2	50	0.83	0.38	0	1	7.39	12.10	2	75	0.97	0.17	0	1	6.19	-0.14
1	6	10.78	11.31	2	63	0.75	0.44	0	1	6.25	5.64	2	27	0.89	0.32	0	1	4.53	-0.14
1	8	9.78	11.52	1	54	0.86	0.35	0	1	4.78	4.36	1	21	0.89	0.32	0	1	5.00	-0.03
1	9	18.53	26.53	2	145	0.75	0.44	0	1	5.08	5.67	2	28	1.00	0.00	1	1	13.44	-0.25
1	10	7.17	7.27	1	30	0.94	0.23	0	1	4.58	3.02	2	15	0.94	0.23	0	1	2.58	0.00
1	11	11.42	10.77	2	44	1.00	0.00	1	1	5.00	3.95	2	17	0.97	0.17	0	1	6.42	0.03
1	12	15.61	14.16	2	69	0.81	0.40	0	1	7.86	6.64	2	26	0.86	0.35	0	1	7.75	-0.06
1	13	8.64	7.56	1	32	0.89	0.32	0	1	5.53	5.47	2	29	0.89	0.32	0	1	3.11	0.00
1	14	8.86	6.12	1	24	0.56	0.50	0	1	6.36	4.44	2	19	0.83	0.38	0	1	2.50	-0.28
1	15	11.11	8.48	1	39	0.58	0.50	0	1	4.61	3.38	1	18	0.75	0.44	0	1	6.50	-0.17
1	16	5.67	4.16	2	19	0.97	0.17	0	1	4.67	4.68	1	19	0.94	0.23	0	1	1.00	0.03
1	17	13.00	18.09	1	100	0.86	0.35	0	1	4.42	4.33	2	24	1.00	0.00	1	1	8.58	-0.14
1	18	6.61	4.78	2	16	0.83	0.38	0	1	4.28	3.15	1	13	0.86	0.35	0	1	2.33	-0.03
1	19	14.67	11.40	2	43	0.78	0.42	0	1	4.39	2.51	2	14	0.94	0.23	0	1	10.28	-0.17
1	20	13.56	13.08	3	70	0.69	0.47	0	1	8.86	5.43	2	22	0.89	0.32	0	1	4.69	-0.19
1	21	14.81	12.63	2	51	0.78	0.42	0	1	7.64	8.19	2	32	0.89	0.32	0	1	7.17	-0.11
1	22	14.17	12.90	1	69	0.72	0.45	0	1	6.03	4.88	2	23	0.78	0.42	0	1	8.14	-0.06
1	23	7.22	6.91	1	27	0.83	0.38	0	1	5.36	5.30	1	26	0.83	0.38	0	1	1.86	0.00
1	24	7.67	6.13	2	30	0.92	0.28	0	1	5.00	4.24	2	23	0.97	0.17	0	1	2.67	-0.06
1	25	11.44	9.46	1	39	0.61	0.49	0	1	7.14	10.50	1	60	0.81	0.40	0	1	4.31	-0.19
1	26	16.42	19.61	2	87	0.92	0.28	0	1	8.44	12.08	1	65	0.92	0.28	0	1	7.97	0.00
1	27	11.61	18.41	2	81	0.86	0.35	0	1	5.25	4.09	1	20	0.89	0.32	0	1	6.36	-0.03
1	28	10.31	10.91	1	63	0.97	0.17	0	1	5.42	4.51	2	23	0.92	0.28	0	1	4.89	0.06

Appendix X.2

Grade	Participant Number	ALP								SUB								ALP-SUB Diff	
		Time				Score				Time				Score				Time	Score
		Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max		
1	29	13.33	13.45	1	55	0.78	0.42	0	1	4.61	3.82	1	21	0.97	0.17	0	1	8.72	-0.19
1	30	5.97	5.35	1	29	0.83	0.38	0	1	3.39	1.93	1	12	0.89	0.32	0	1	2.58	-0.06
1	31	11.14	9.51	2	34	0.69	0.47	0	1	8.89	10.60	1	53	0.86	0.35	0	1	2.25	-0.17
1	32	11.00	7.85	1	29	0.75	0.44	0	1	5.33	5.05	1	26	1.00	0.00	1	1	5.67	-0.25
1	33	17.50	13.49	3	59	0.92	0.28	0	1	8.47	9.24	2	48	0.94	0.23	0	1	9.03	-0.03
1	34	11.28	9.31	2	39	0.81	0.40	0	1	8.44	4.46	2	19	0.92	0.28	0	1	2.83	-0.11
1	35	14.83	19.03	2	82	0.81	0.40	0	1	7.61	8.81	2	39	0.92	0.28	0	1	7.22	-0.11
1	36	31.67	28.62	3	108	0.69	0.47	0	1	6.53	5.39	2	26	0.94	0.23	0	1	25.14	-0.25
1	37	13.28	10.74	1	35	0.61	0.49	0	1	4.64	6.22	1	37	0.89	0.32	0	1	8.64	-0.28
1	38	9.03	8.83	2	42	0.81	0.40	0	1	4.06	2.11	2	12	0.89	0.32	0	1	4.97	-0.08
1	39	9.22	8.29	2	42	0.81	0.40	0	1	6.00	7.32	2	43	0.97	0.17	0	1	3.22	-0.17
1	40	13.92	10.99	1	43	0.28	0.45	0	1	7.42	5.17	1	28	0.72	0.45	0	1	6.50	-0.44
1	41	11.64	11.31	2	50	0.83	0.38	0	1	6.36	7.98	2	36	0.94	0.23	0	1	5.28	-0.11
1	42	13.75	25.39	1	137	0.97	0.17	0	1	5.31	4.39	1	20	0.92	0.28	0	1	8.44	0.06
1	43	9.94	8.16	2	35	0.92	0.28	0	1	6.19	6.57	2	34	0.94	0.23	0	1	3.75	-0.03
1	44	14.75	14.72	2	50	0.94	0.23	0	1	5.08	6.69	2	41	0.97	0.17	0	1	9.67	-0.03
1	45	12.67	14.57	2	74	0.83	0.38	0	1	5.78	4.74	1	29	0.94	0.23	0	1	6.89	-0.11
2	48	7.83	7.31	2	36	0.92	0.28	0	1	4.08	2.45	2	13	1.00	0.00	1	1	3.75	-0.08
2	49	8.78	9.01	2	36	0.97	0.17	0	1	5.81	6.48	1	31	1.00	0.00	1	1	2.97	-0.03
2	50	7.81	7.60	1	29	0.86	0.35	0	1	4.94	5.94	1	35	0.97	0.17	0	1	2.86	-0.11
2	51	8.92	8.44	1	37	1.00	0.00	1	1	5.11	9.19	1	57	0.89	0.32	0	1	3.81	0.11
2	52	7.61	6.20	1	28	0.92	0.28	0	1	4.50	7.06	1	45	0.97	0.17	0	1	3.11	-0.06
2	53	6.56	5.19	1	23	0.97	0.17	0	1	3.14	1.69	1	11	0.94	0.23	0	1	3.42	0.03
2	54	7.42	7.38	2	35	0.86	0.35	0	1	6.72	4.49	1	22	0.92	0.28	0	1	0.69	-0.06
2	55	6.39	4.62	2	29	0.92	0.28	0	1	4.64	3.00	2	15	0.94	0.23	0	1	1.75	-0.03
2	56	6.22	3.81	2	15	0.92	0.28	0	1	3.92	2.48	1	13	0.94	0.23	0	1	2.31	-0.03
2	57	7.06	7.26	2	44	0.94	0.23	0	1	3.19	1.83	1	9	0.94	0.23	0	1	3.86	0.00
2	58	11.14	9.41	1	33	0.83	0.38	0	1	5.00	4.08	1	16	1.00	0.00	1	1	6.14	-0.17

Appendix X.3

Grade	Participant Number	ALP								SUB								ALP-SUB Diff	
		Time				Score				Time				Score				Time	Score
		Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max		
2	59	9.06	8.13	2	35	0.92	0.28	0	1	4.36	3.45	2	22	0.94	0.23	0	1	4.69	-0.03
2	60	8.89	9.17	1	46	0.75	0.44	0	1	2.86	2.00	1	11	0.89	0.32	0	1	6.03	-0.14
2	61	10.89	10.20	1	44	0.72	0.45	0	1	4.19	4.08	1	20	0.97	0.17	0	1	6.69	-0.25
2	62	7.58	6.42	2	33	0.97	0.17	0	1	4.19	2.56	1	12	0.97	0.17	0	1	3.39	0.00
2	63	8.61	7.33	2	35	0.72	0.45	0	1	5.06	4.00	1	19	0.83	0.38	0	1	3.56	-0.11
2	64	8.44	4.82	2	22	0.94	0.23	0	1	4.67	5.09	1	29	0.97	0.17	0	1	3.78	-0.03
2	65	9.58	12.00	1	49	0.94	0.23	0	1	5.11	10.50	1	57	0.97	0.17	0	1	4.47	-0.03
2	66	8.58	7.55	1	29	0.89	0.32	0	1	4.33	4.43	1	21	0.94	0.23	0	1	4.25	-0.06
2	67	19.67	18.38	2	90	0.75	0.44	0	1	5.33	4.96	2	26	0.92	0.28	0	1	14.33	-0.17
2	68	8.00	8.18	1	43	0.94	0.23	0	1	4.36	6.32	1	33	0.94	0.23	0	1	3.64	0.00
2	69	9.50	7.67	2	33	0.92	0.28	0	1	5.64	8.56	2	50	0.94	0.23	0	1	3.86	-0.03
2	70	11.53	11.42	2	49	0.86	0.35	0	1	5.08	4.34	1	19	0.97	0.17	0	1	6.44	-0.11
2	71	8.97	9.65	1	47	0.89	0.32	0	1	5.28	8.89	1	52	0.92	0.28	0	1	3.69	-0.03
2	72	7.69	7.39	2	33	0.94	0.23	0	1	4.44	3.89	2	24	0.97	0.17	0	1	3.25	-0.03
2	73	8.89	6.95	2	34	0.86	0.35	0	1	5.44	4.27	1	17	0.94	0.23	0	1	3.44	-0.08
2	74	7.86	5.44	2	24	0.89	0.32	0	1	3.42	2.52	1	13	0.94	0.23	0	1	4.44	-0.06
2	75	8.25	7.75	2	39	0.81	0.40	0	1	5.86	4.99	1	26	0.81	0.40	0	1	2.39	0.00
2	76	6.39	4.95	1	26	0.92	0.28	0	1	4.22	2.71	1	14	0.83	0.38	0	1	2.17	0.08
2	77	9.36	8.90	1	36	0.94	0.23	0	1	3.69	1.62	1	8	0.92	0.28	0	1	5.67	0.03
2	78	13.58	15.04	2	78	0.89	0.32	0	1	4.81	4.70	2	27	0.92	0.28	0	1	8.78	-0.03
2	79	9.67	8.16	1	34	0.83	0.38	0	1	6.22	8.12	2	45	1.00	0.00	1	1	3.44	-0.17
2	80	10.42	11.92	2	58	0.83	0.38	0	1	4.19	3.04	2	19	0.94	0.23	0	1	6.22	-0.11
3	81	6.22	4.68	2	19	1.00	0.00	1	1	3.17	2.32	1	14	1.00	0.00	1	1	3.06	0.00
3	82	5.39	5.07	1	28	0.92	0.28	0	1	3.14	1.48	2	9	0.97	0.17	0	1	2.25	-0.06
3	83	6.36	5.03	1	23	0.97	0.17	0	1	5.00	4.43	1	25	0.92	0.28	0	1	1.36	0.06
3	84	5.64	5.86	1	25	0.92	0.28	0	1	6.53	8.57	2	53	0.86	0.35	0	1	-0.89	0.06
3	85	4.61	2.80	1	15	0.97	0.17	0	1	3.81	3.20	1	15	1.00	0.00	1	1	0.81	-0.03
3	86	6.00	4.25	2	23	0.92	0.28	0	1	2.92	1.66	1	8	0.92	0.28	0	1	3.08	0.00

Appendix X.4

Grade	Participant Number	ALP								SUB								ALP-SUB Diff	
		Time				Score				Time				Score				Time	Score
		Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max		
3	87	4.83	2.57	2	12	0.94	0.23	0	1	3.31	2.08	1	10	0.97	0.17	0	1	1.53	-0.03
3	88	6.03	3.76	1	15	0.94	0.23	0	1	3.31	2.05	2	11	0.97	0.17	0	1	2.72	-0.03
3	89	5.89	4.98	1	26	0.86	0.35	0	1	3.22	1.73	1	9	1.00	0.00	1	1	2.67	-0.14
3	90	7.58	5.62	1	29	0.97	0.17	0	1	5.03	3.91	2	20	0.94	0.23	0	1	2.56	0.03
3	91	6.17	4.69	2	18	0.97	0.17	0	1	3.75	2.20	1	12	1.00	0.00	1	1	2.42	-0.03
3	92	5.06	3.16	1	14	0.97	0.17	0	1	3.97	2.76	2	15	0.97	0.17	0	1	1.08	0.00
3	93	5.83	4.82	1	23	0.94	0.23	0	1	3.44	3.52	1	22	0.94	0.23	0	1	2.39	0.00
3	94	4.06	1.82	1	10	1.00	0.00	1	1	3.83	2.91	2	16	1.00	0.00	1	1	0.22	0.00
3	95	5.53	4.64	1	21	0.92	0.28	0	1	3.94	3.21	1	14	0.94	0.23	0	1	1.58	-0.03
3	96	7.42	6.78	1	27	0.92	0.28	0	1	3.94	3.37	1	14	0.97	0.17	0	1	3.47	-0.06
3	97	6.06	4.82	1	24	0.97	0.17	0	1	3.56	2.72	1	16	1.00	0.00	1	1	2.50	-0.03
3	98	8.64	10.28	2	47	0.92	0.28	0	1	4.89	3.33	2	18	0.94	0.23	0	1	3.75	-0.03
3	99	5.11	3.36	1	14	0.97	0.17	0	1	4.50	6.84	1	40	0.94	0.23	0	1	0.61	0.03
3	100	4.42	3.06	1	14	0.94	0.23	0	1	3.08	1.20	1	6	1.00	0.00	1	1	1.33	-0.06
3	101	6.06	3.58	1	16	0.94	0.23	0	1	3.53	2.27	1	12	0.92	0.28	0	1	2.53	0.03
3	102	10.92	14.36	1	51	0.97	0.17	0	1	7.89	9.24	1	34	0.92	0.28	0	1	3.03	0.06
3	103	5.56	5.17	2	27	0.97	0.17	0	1	3.67	2.79	1	13	1.00	0.00	1	1	1.89	-0.03
3	104	5.36	5.07	1	29	1.00	0.00	1	1	3.19	2.46	1	14	1.00	0.00	1	1	2.17	0.00
3	105	8.14	8.42	2	47	0.92	0.28	0	1	3.42	3.32	1	17	1.00	0.00	1	1	4.72	-0.08
3	107	6.42	5.02	1	19	0.86	0.35	0	1	5.00	5.29	1	27	0.86	0.35	0	1	1.42	0.00
3	108	5.11	3.30	1	12	1.00	0.00	1	1	3.50	3.05	1	18	0.94	0.23	0	1	1.61	0.06
3	109	6.14	3.98	1	19	0.97	0.17	0	1	3.53	1.83	1	10	1.00	0.00	1	1	2.61	-0.03
3	110	5.33	2.69	1	11	0.92	0.28	0	1	3.42	2.06	1	12	0.97	0.17	0	1	1.92	-0.06
3	111	8.25	7.59	2	36	0.86	0.35	0	1	3.50	2.30	1	14	0.89	0.32	0	1	4.75	-0.03
3	112	7.58	6.85	2	29	0.97	0.17	0	1	5.69	5.14	2	27	0.97	0.17	0	1	1.89	0.00
3	113	5.39	3.78	1	17	1.00	0.00	1	1	4.81	5.32	2	29	1.00	0.00	1	1	0.58	0.00
3	114	9.33	11.21	2	63	0.89	0.32	0	1	6.69	12.21	2	74	1.00	0.00	1	1	2.64	-0.11

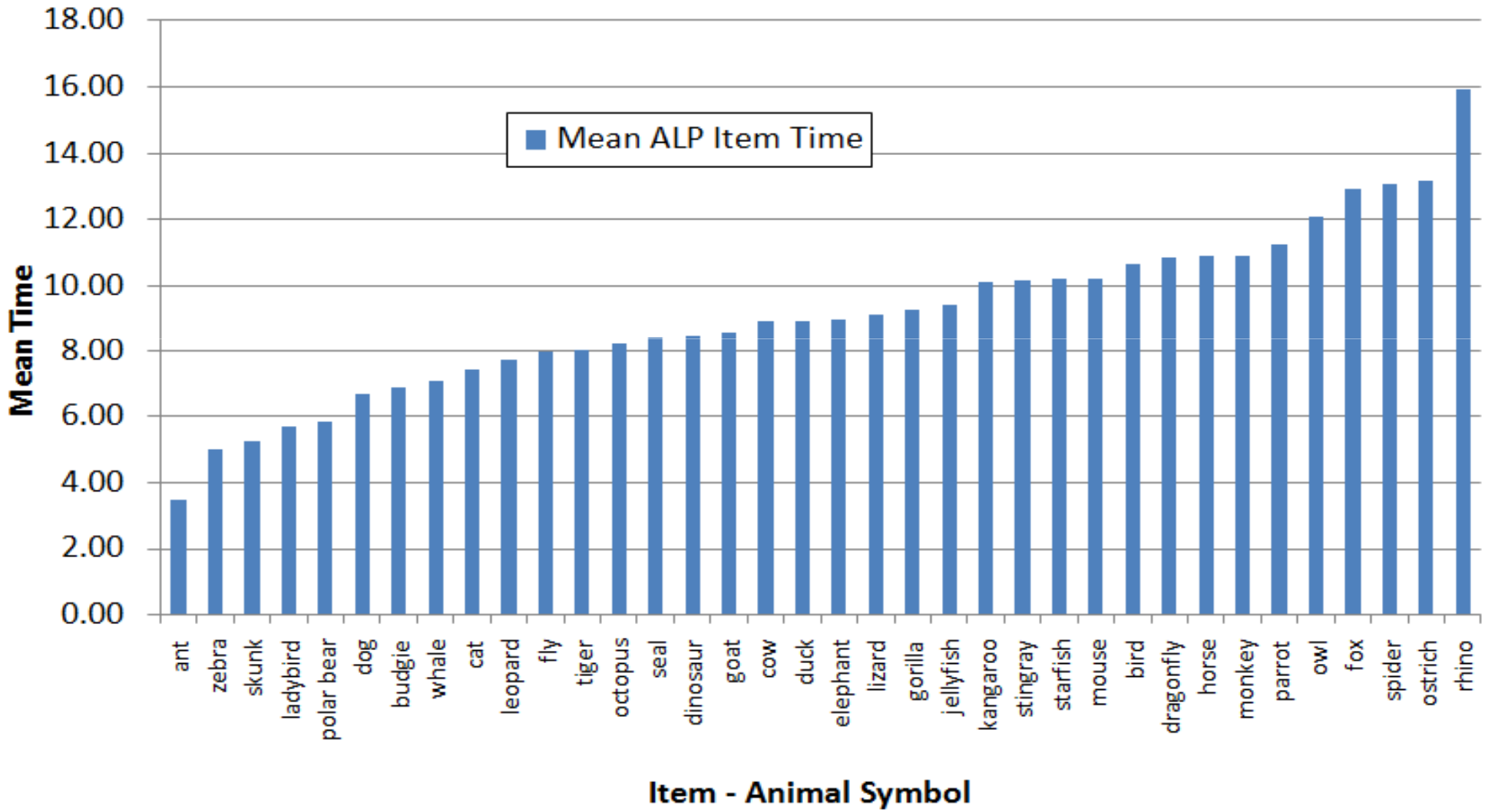
Mean scores higlighted in grey indicate data in which there was one of the 36 items which was incorrecly recorded (see section 3.6.6).

Appendix Y: Item data

Item No	Symbol	Time		Score					
		ALP	SUB	ALP			SUB		
				% Correct	% Escape	% Error	% Correct	% Escape	% Error
1	cow	9.27	5.06	91.75	4.59	3.67	92.66	3.67	3.67
2	mouse	10.77	12.68	88.07	8.25	3.67	86.24	7.34	6.42
3	fly	8.28	3.28	91.74	1.83	6.42	94.49	0.92	4.59
4	budgie	7.02	8.09	92.66	3.67	3.67	80.73	11.01	8.26
5	elephant	9.28	4.95	86.24	7.34	6.42	97.25	1.83	0.92
6	spider	13.69	4.99	83.49	10.09	6.42	97.25	0.00	2.75
7	skunk	5.49	7.36	89.91	3.67	6.42	88.99	8.26	2.75
8	octopus	8.35	3.68	90.83	6.42	2.75	94.50	0.92	4.59
9	duck	9.45	7.20	86.24	8.26	5.50	92.66	2.75	4.59
10	tiger	8.01	3.01	91.74	4.59	3.67	96.33	0.00	3.67
11	zebra	5.23	4.18	95.41	2.75	1.83	93.58	2.75	3.67
12	gorilla	9.55	7.18	87.15	8.26	4.59	90.83	3.67	5.50
13	whale	7.15	3.22	95.41	1.83	2.75	94.49	3.67	1.83
14	ostrich	13.88	8.69	82.57	10.09	7.34	87.16	7.34	5.50
15	ladybird	5.69	2.70	95.41	0.92	3.67	99.08	0.00	0.92
16	starfish	10.45	4.12	82.57	7.34	10.09	97.25	1.83	0.92
17	parrot	11.49	4.00	81.65	12.84	5.50	91.74	3.67	4.59
18	polar bear	6.04	2.49	92.66	2.75	4.59	98.17	0.00	1.83
19	bird	11.34	4.16	83.49	10.09	6.42	92.66	3.67	3.67
20	dragonfly	11.55	4.66	80.73	13.76	5.50	88.99	3.67	7.34
21	jellyfish	9.30	2.46	85.32	11.01	3.67	98.16	0.00	1.83
22	dinosaur	8.81	4.46	94.50	1.83	3.67	97.25	0.92	1.83
23	fox	12.84	6.04	83.49	10.09	6.42	92.66	1.84	5.50
24	cat	7.64	3.47	89.91	3.67	6.42	88.99	1.83	9.17
25	kangaroo	10.32	7.79	76.15	14.68	9.17	94.50	2.75	2.75
26	owl	12.73	4.47	78.90	17.43	3.67	95.41	1.83	2.75
27	goat	8.62	7.80	89.91	5.50	4.59	88.07	6.42	5.50
28	leopard	7.94	3.68	89.91	8.26	1.83	91.74	2.75	5.50
29	horse	10.98	4.94	86.24	9.17	4.59	95.41	3.67	0.92
30	stingray	10.46	4.10	81.65	9.17	9.17	95.41	0.00	4.59
31	monkey	11.23	5.97	77.07	14.68	8.26	97.25	0.92	1.83
32	dog	6.93	3.31	95.41	2.75	1.83	94.50	0.92	4.59
33	lizard	9.27	4.50	83.49	9.17	7.34	95.41	1.83	2.75
34	ant	3.56	3.85	96.33	0.92	2.75	95.41	1.84	2.75
35	rhino	16.39	4.57	69.73	22.02	8.26	92.66	3.67	3.67
36	seal	8.57	3.40	88.07	7.34	4.59	96.33	1.83	1.83

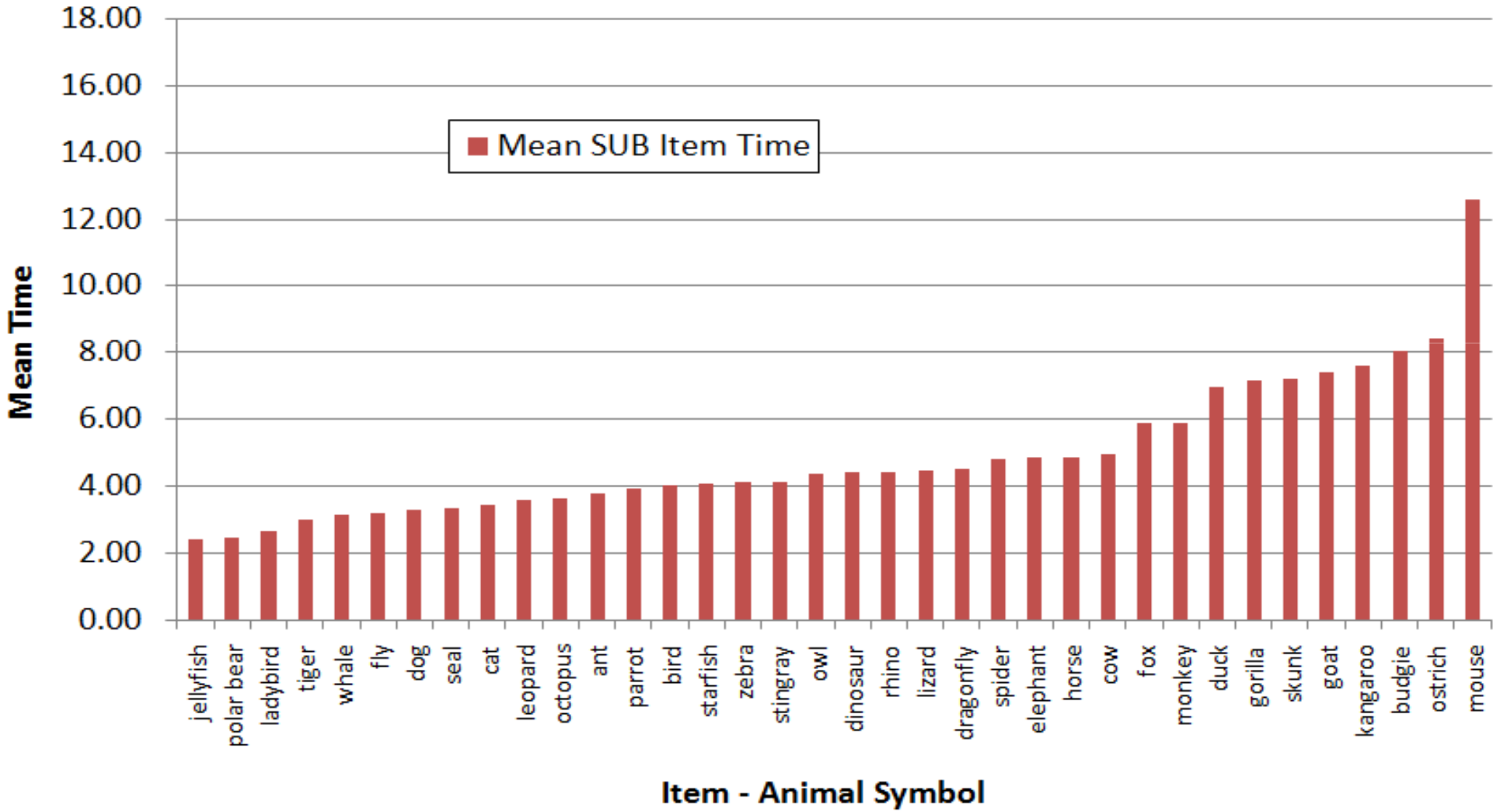
Appendix Z: Mean time for test items

Mean time for ALP test items



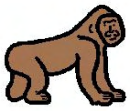
Appendix Z.2

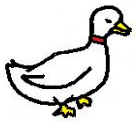
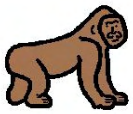
Mean time for SUB test items



Appendix AA - Error symbols

The most common errors that can not be explained by being a neighbouring cell of a target cell are presented below. Errors selections that were symbols in neighbouring cells to the target cell were considered to probably be due to mouse control factors.

ALP	Target	cat 	kangaroo 	dragonfly 	ostrich 	monkey 
	Selected	kitten 	koala bear 	fly 	flamingo 	gorilla 

SUB	Target	dog 	leopard 	dragonfly 	cat 	bear 	duck 
	Selected	puppy 	hyena 	fly 	kitten 	gorilla 	seagull 

Appendix AB: Comparison between experimental research, this study and AAC usage

Key	Equivalence between this study and AAC usage.
	Similarities between this study and AAC usage.
	Equivalence between experimental research and this study.
	Similarities between experimental research and this study.
	Minimal similarity between experimental research, this study and AAC usage.

	Experimental research	This study	AAC usage
Visual characteristics of symbols	Arbitrary visual images	Line drawings representational form (PCS symbols)	Various representational forms, such as photos, line drawings and words
	Simple images - often single featured or a simple conjunction of features	Complex images made up of very many basic features, such as lines, shapes, colours and details	Complex images made up of very many basic features, such as lines, shapes, colours and details
	Various colours, such as black on white, white on black or multi-coloured	Multi-coloured	Predominantly multi-coloured
Arrangement of symbols in visual display	Usually minimal relationship between placement of one symbol and another	Structured arrangement of symbols in rows and columns	Structured arrangement of symbols in rows and columns
	No lines or markers to demarcate areas in the visual field or to separate items	Grid format - horizontal and vertical lines (or spaces that form lines) to separate symbols	Grid format - horizontal and vertical lines (or spaces that form lines) to separate symbols
	Usually randomly placed across display	Organised by category or alphabetical order	Variably organized, often by category or alphabetical order
Colour coding	Seldom specific highlighting of individual symbols	Symbol background colour-coding to highlight category or alphabetical groupings	Variably highlighted by strategies such as symbol background colour groupings, font, cell shape and border colours
	Seldom grouping of symbols in specific areas in display	Grouping of colour-coded symbols in specific areas on display	Sometimes grouping of colour-coded symbols in specific areas in grid, sometimes colour-coded symbols are scattered in grid

	Experimental research	This study	AAC usage
Semantic characteristics of symbol	Predominantly non-referential or non-symbolic	Referential / symbolic	Referential / symbolic
	No gloss present	Gloss present	Gloss present
	Abstract	Nouns	All parts of speech
	Non-contextual	Non-contextual	Contextual
Use of symbol	Experimental activity	Experimental activity	Functional activity
	Single symbol	Single symbol	Multiple symbols joined together
	Isolated - unrelated to the previous or subsequent symbol	Isolated - unrelated to the previous or subsequent symbol	Symbol part of a sentence – used in message generation, where user is formulating a unique message and each symbol has a specific function in the message
	On command of researcher - the participant is told what symbol to find next	On command of researcher – the participant is told what symbol to find next	Self-determined
	All symbols used are repeated in exactly the same form and order for each participant	All symbols used are repeated in exactly the same form and order for each participant	Unique interaction with symbol - symbol use is dependent on the message needs of the user
	Visual perception of a target before search begins	Visual perception of a target before search begins	No initial visual perception of a target - symbol elicited by independent thought on the part of the user
	Target location occurs when there is a recognition match between the symbol in working memory and the symbol in the display.	Target location occurs when there is a recognition match between the symbol in working memory and the symbol in the display.	Target location occurs when there is a match between a code (visual or semantic?) in memory and the target
	Decision making processes are seldom required to begin a search for a target - only decision relating to identification of presence or absence of target required	A decision making process must occur between the initial visual perception of the symbol and where to focus the search in the array	A thought process concerning which symbol to search for must occur and a decision must be made where to focus the search for the target in the array
Participants	People without disabilities	People without disabilities	People with disabilities
	All ages - mostly adults	Children, ages 6-9	All ages – mostly children if PCS symbols are used

	Experimental research	This study	AAC usage
Methodology of testing	First time exposure	First time exposure	Much exposure to system, through training, user development over time, growth of system, and functional practice
	Reaction time and accuracy are the most common variables measured	Reaction time and accuracy are the most common variables measured	The message to be communicated is the most important issue in measuring the use of the AAC system
	A 'match-to-sample' task (sometimes delayed)	A delayed 'match-to-sample' task	No match to a previously presented symbol
	Memory of the symbol is required if the target is removed from view	Memory of the symbol is required as the target is removed from view and has to be found in another field	Memory of symbol's availability and in which grid it will be found is required. Memory of specific cell location is useful
	Reaction time is the sum of the observation time + identification time + decision time (which motor response to make) + motor response execution time	Time is measured from the mouse click on the target to the mouse click on the selected symbol (i.e. identification time + motor response execution time)	Selection time not measured
	Data collected measured in msecs.	Data collected measured in secs.	Selection time not measured
	Symbol usually exposed for very brief periods	Symbol exposed for as long as participant wants. However, participants are urged to complete the test as quickly as they can	Symbol exposed for as long as user wants. AAC users have their symbols available at all times and can control how long they attend to the symbol
	The participant is required to make a choice of two different motor responses (e.g. to hit a switch to indicate yes or no for presence or absence of target)	The participant is required to indicate target location with a mouse click on the target	The participant is required to indicate target location with a mouse click on the target, direct selection on touch screens and manual boards, or a switch press if scanning
	Target may be present (about 50% of trials)	Target always present	Target usually present. If not, and required, can be added to system
	A range of two symbols to many symbols to match the target symbol against	81 symbols to match the target against	A wide range in the number of symbols to locate the desired symbol in