

**CHAPTER 4
RESULTS AND DISCUSSION**

4.1 INTRODUCTION

Chapter 3 described the research methodology of the study. This chapter describes the results obtained, which are discussed against the background of the sub-aims as stated in the previous chapter. The responses elicited for each icon will be discussed in terms of the different common associations and the percentage of commonality with which these associations occurred. The influence of the different cueing questions on the types and percentage of occurrence of the elicited associations is reviewed. Finally, the results of a comparison between the elicited associations and the current Unity™ vocabulary are described and discussed.

4.2 RESPONSE RATE

As described in Chapter 3, a self-administered questionnaire was used to elicit associations from tertiary education students. A high average response rate of 97 % was achieved, which indicates that on average 97 % of respondents provided associations across the different questions, ranging between 96 and 99 % for different icons. Table 4-1 is a summary of the response rate per question per icon.

Table 4-1: Summary of response rate per question per icon

Icon	Percentage of responses per question (%)													Average response rate (%) per icon
	1	2	3	4	5	6	7	8	9	10	11	12	13	
apple	100	100	100	100	100	100	95	100	98	100	98	98	98	99
wanted	100	95	98	98	98	98	90	93	100	98	93	95	90	96
thumbs up	100	100	93	100	95	100	98	98	100	88	83	95	98	96
thumbs down	100	98	98	100	98	98	93	100	100	95	90	98	100	98
frog	100	95	100	100	100	100	98	85	98	90	93	100	85	96
interjection	100	100	93	100	100	100	98	98	98	93	93	95	98	97
sentence	100	98	98	100	95	100	95	95	100	95	90	100	100	97
knot	100	98	93	100	100	100	88	98	98	98	100	95	100	98
stop	100	100	100	100	100	100	93	98	100	100	100	95	100	99
return	100	98	100	95	100	95	88	93	98	98	98	95	93	96
medical	100	100	100	100	100	98	98	98	100	100	98	95	90	98
music	100	100	98	100	95	100	95	95	95	85	93	93	95	96
Average response rate (%) per question	100	99	98	99	98	99	94	96	99	95	94	96	96	97

Table 4-1 indicated that there were marginal differences among some of the questions of some of the icons, with only 5 questions across all the icons achieving a response rate of below 90%. However, all questions across all 12 icons achieved a response rate of 85 % or more. Table 4-1 also provides the average response rate *per question*, and the average response rate *per icon*. These results indicate that there were no significant differences in response rate between icons, with all the *icons* achieving a response rate of above 96 % and all the *questions* achieving a response rate of above 94 %.

4.3 ASSOCIATION PERFORMANCE

The elicited associations were pruned, computerised and analysed to determine the extent of commonality that occurred in the elicited associations per question per icon. In collaboration with the second rater, associations were grouped into semantic fields and the percentage of commonality calculated. An arbitrary percentage of 15 % was required of a specific association in order to be regarded as a common association. All the common associations (i.e. those with a percentage of more than 15 %) were recorded onto recording sheets - one for every question of every icon. The common association with the highest percentage of commonality were designated the 1st level association, with the 2nd and 3rd level associations as the subsequent most common associations. In all cases there were a maximum of three common associations (> 15 %), but sometimes only one or two. Associations that did not achieve a percentage of commonality of more than 15 % were grouped together as “other associations”. These associations were not discarded, as they might prove to be useful once a vocabulary list for South African VOCA users is compiled.

The recording sheets completed for every question of every icon included the different areas of commonality (1st, 2nd and 3rd level common associations), the percentage of commonality, the percentage of “other associations”, the average of commonality across the different levels of common associations, as well as the words included in every area of commonality (see Appendix D for an example). Table 4-2 is a summary of all the percentages of commonality calculated for every level of commonality per question per icon, as well as the averages achieved for each of these per icon. Refer to Table 2-6 for a list of the cueing questions.

Table 4-2: Percentages of common associations (%) per question

Icon and level of common association	Number of cueing question																
	1	2	3	4	5.1	5.2	5.3	5.4	6	7	8	9	10	11	12	13	Average
	Percentages of common associations (%)																
APPLE 1 ST	80	89	61	57	48	59	76	50	54	56	42	64	94	52	72	92	65
APPLE 2 ND	18	-	39	19	26	24	-	25	33	31	29	36	-	20	-	-	27
APPLE 3 RD	-	-	-	19	21	-	-	25	-	-	-	-	-	17	-	-	21
OTHER ASSOCIATIONS	2	11	-	5	5	17	24	-	13	13	29	-	6	11	28	8	13
Common associations' average	49	89	50	32	32	41	76	33	44	44	36	50	94	30	72	92	54
FROG 1 ST	43	25	42	47	72	33	77	87	64	59	16	89	40	33	27	53	50
FROG 2 ND	34	20	25	33	-	33	18	-	26	16	16	-	22	26	18	24	24
FROG 3 RD	-	-	17	19	-	33	-	-	-	-	-	-	-	-	-	21	23
OTHER ASSOCIATIONS	23	55	16	-	28	-	5	13	10	25	68	11	38	41	55	2	29
Common associations' average	39	23	28	33	72	33	47	87	45	38	16	89	31	30	21	32	42
INTERJECTION 1 ST	60	43	45	35	79	40	70	63	31	58	45	25	51	37	34	28	47
INTERJECTION 2 ND	27	22	24	24	-	33	30	-	25	27	37	19	19	22	26	25	26
INTERJECTION 3 RD	-	16	17	22	-	27	-	-	24	-	-	18	18	-	19	18	20
OTHER ASSOCIATIONS	13	19	14	19	21	-	-	37	20	15	18	38	12	41	21	29	23
Common associations' average	43	27	29	27	79	33	50	63	27	42	41	22	29	29	26	23	37
KNOT 1 ST	57	60	55	55	52	68	80	50	39	32	44	40	49	37	41	77	53
KNOT 2 ND	40	33	38	45	28	-	-	40	35	26	28	39	24	29	33	19	33
KNOT 3 RD	-	-	-	-	-	-	-	-	26	19	-	-	-	17	-	-	21
OTHER ASSOCIATIONS	3	7	7	-	20	32	20	10	-	23	28	21	27	17	26	4	18
Common associations' average	49	46	45	50	40	68	80	45	33	26	36	39	37	28	37	48	44
MEDICAL 1 ST	84	47	58	63	77	50	36	75	45	62	69	51	83	60	36	69	60
MEDICAL 2 ND	16	31	23	27	-	25	36	-	24	17	25	32	-	-	23	24	25
MEDICAL 3 RD	-	22	19	-	-	-	21	-	17	-	-	16	-	-	19	-	19
OTHER ASSOCIATIONS	-	-	-	10	23	25	7	25	14	21	6	1	17	40	22	7	17
Common associations' average	50	33	33	45	77	38	31	75	29	39	47	33	83	60	26	46	47
MUSIC 1 ST	91	27	56	68	47	38	71	33	44	57	39	35	16	46	37	81	49
MUSIC 2 ND	-	24	-	-	40	-	-	33	30	23	33	23	-	25	26	-	29
MUSIC 3 RD	-	16	-	-	-	-	-	17	-	-	-	-	-	-	-	-	17
OTHER ASSOCIATIONS	9	33	44	32	13	62	29	17	26	20	28	42	84	29	37	19	33
Common associations' average	91	22	56	68	43	38	71	28	37	40	36	29	16	35	32	81	45
RETURN 1 ST	62	26	33	33	50	86	41	17	27	28	32	30	24	16	17	57	36
RETURN 2 ND	21	23	28	33	43	-	41	-	22	16	17	19	21	16	15	19	24
RETURN 3 RD	-	21	21	24	-	-	-	-	-	-	-	-	-	-	-	-	22
OTHER ASSOCIATIONS	17	30	18	10	7	14	18	83	51	56	51	51	55	68	68	24	39
Common associations' average	42	23	27	30	46	86	41	17	25	22	24	24	22	16	16	38	31
SENTENCE 1 ST	48	72	45	89	60	50	50	44	82	30	87	31	36	27	34	78	54
SENTENCE 2 ND	46	-	43	-	20	25	25	28	16	30	-	29	22	-	-	-	28
SENTENCE 3 RD	-	-	-	-	20	25	-	22	-	21	-	19	17	-	-	-	21
OTHER ASSOCIATIONS	6	28	12	11	-	-	25	6	2	19	13	21	25	73	66	22	24
Common associations' average	47	72	44	89	33	33	38	31	49	27	87	26	25	27	34	78	47
STOP 1 ST	76	58	88	75	38	71	64	85	82	54	70	37	52	47	35	61	62
STOP 2 ND	17	23	-	20	25	29	36	15	-	26	26	25	30	26	25	31	25
STOP 3 RD	-	-	-	-	-	-	-	-	-	-	-	16	-	17	16	-	16
OTHER ASSOCIATIONS	7	19	12	5	38	-	-	-	18	20	4	22	18	10	25	8	16
Common associations' average	47	40	88	47	31	50	50	50	82	40	48	26	41	30	25	46	46

Table 4-2: Percentages of common associations (%) per question (cont.)

Icon and level of common association	Number of cueing question													Average			
	1	2	3	4	5.1	5.2	5.3	5.4	6	7	8	9	10		11	12	13
	Percentages of occurrence of common associations (%)																
THUMBS UP 1 ST	63	59	34	63	25	42	20	53	63	50	70	40	52	32	53	72	49
THUMBS UP 2 ND	32	28	25	33	25	25	20	21	-	-	-	20	36	-	17	-	26
THUMBS UP 3 RD	-	-	16	-	19	-	20	-	-	-	-	16	-	-	-	-	18
OTHER ASSOCIATIONS	5	13	25	4	31	33	40	26	37	50	30	24	12	68	30	28	29
Common associations' average	47	44	25	48	23	33	20	37	63	50	70	25	44	32	35	72	42
THUMBS DN 1 ST	44	33	40	100	20	56	18	27	44	51	44	49	39	32	65	37	44
THUMBS DN 2 ND	34	32	19	-	20	22	82	20	31	24	30	37	24	16	18	33	29
THUMBS DN 3 RD	16	25	19	-	20	-	-	20	-	-	-	-	-	16	-	-	19
OTHER ASSOCIATIONS	6	10	22	-	40	22	-	33	25	25	26	14	37	36	18	31	25
Common associations' average	31	30	26	100	20	39	50	22	38	37	37	43	31	21	41	35	38
WANTED 1 ST	38	28	30	58	50	73	25	60	49	42	34	39	24	48	37	41	43
WANTED 2 ND	30	28	23	16	31	20	22	20	20	29	34	36	24	-	-	28	26
WANTED 3 RD	22	-	-	-	-	-	19	20	20	16	-	22	20	-	-	-	20
OTHER ASSOCIATIONS	10	44	47	26	19	7	33	-	11	13	32	3	32	52	63	31	28
Common associations' average	30	28	26	37	41	47	22	33	30	29	34	32	23	48	37	23	32

From Table 4-2 it appears that there were two basic patterns of association performance for different questions of different icons. The first pattern was where there was one common association with a high percentage of commonality (>60%), with (in some cases) one other association with a much lower percentage of commonality (<25%). The second pattern was where there were two or three common associations elicited, all with moderately high percentages of commonality (26 - 59%). Each of these patterns have value when looking at the laws of minimal learning and minimal energy. If an icon elicited one major common association (commonality of >60%), with another minor common association (commonality of <25%) a high level of agreement is indicated, which might suggest that more participants were familiar with the referent in terms of the major common association. If an icon elicited two or three associations per question (commonality between 26 and 45%), common associations with a wider range might be obtained, but because of a lower percentage of commonality might be less familiar to some users and might therefore need additional support in learning. Both these patterns are quite important when an attempt is made to adapt a system like Unity™ for the South African context. It is necessary to establish a common association that is familiar to a large group of people, but with the added richness of other common associations albeit of moderate commonality (26 - 45%), to cater for different users with different characteristics, world knowledge and experience. Thus, it is not only the associations with high percentages of commonality that are usable, but associations that were elicited less frequently might require more effort to learn for some people. This does not

necessarily comply with the laws of minimal learning and minimal energy.

4.3.1 Association performance per question

Table 4-3 summarizes the averages derived from Table 4-2 including data for every question across all the icons.

Table 4-3: Average percentages of common associations per question (%)

	Number of cueing question															
	1	2	3	4	5.1	5.2	5.3	5.4	6	7	8	9	10	11	12	13
	Average percentages of common associations (%)															
Average of common associations per question	47	40	40	51	45	45	48	43	42	36	43	37	40	32	34	51
Average of "other" associations per question	8	22	18	10	20	18	17	21	19	26	29	21	30	41	38	9

Table 4-3 indicates that all the questions elicited common associations with average percentages ranging between 32 and 51 %. The results indicated that cueing questions 1, 4 and 13 elicited slightly higher average percentages (>47 % commonality) than the rest, with cueing questions 7, 9, 11 and 12 eliciting slightly lower average percentages (<37 % commonality). These results were confirmed by the averages of "other" associations elicited. It is interesting to note that the response rate *per question* (see Table 4-1) indicated that questions 7 and 11 had slightly lower response rates (94 %), in addition to having lower average percentages. The response rate for questions 1 and 4 were very high (100% and 99% respectively) and these questions elicited slightly higher average percentages. However, the response rate for question 9 is high (99 %) and yet its average percentage is among the lowest, indicating that almost all the participants responded with associations, but that the elicited associations were substantially diverse. There are a number of possibilities that could explain this phenomenon: (i) the question might not have been clear to some of the participants, where culture, gender, language and/or age could have had an effect; (ii) these question depended heavily on world knowledge and frame of reference, and elicited a wide variety of responses retrieved from each person's episodic memory, where variety undermined commonality; (iii) interaction between these and other factors could have influenced the association performance.

However, with regards to the averages of common associations elicited by every cueing question, the range is quite narrow (with a difference of less than 20 %), suggesting that the

cueing questions might have been effective in eliciting a number of common associations. The “other associations” elicited cater for a variety and diversity across cultures, languages, sexes, ages and genders and this might prove to be a positive aspect once a list of probable words to include in Unity™ for South Africans is compiled, as the South African population is heterogeneous in many aspects.

4.3.2 Association performance per icon

Table 4-4 provides a summary of the average percentages of commonality derived from Table 4-2 (calculating the average of commonality across the 1st, 2nd and 3rd level common associations), as well as the average percentage of commonality achieved by the 1st level association per icon across questions and the range of these percentages.

Table 4-4: Average percentages of commonality per icon (highest to lowest %)

ICON	AVERAGE OF COMMONALITY AVERAGES ACROSS QUESTIONS (%)	AVERAGE OF THE PERCENTAGES OF THE 1 ST LEVEL COMMON ASSOCIATIONS (%)	RANGE OF HIGHEST PERCENTAGES OF 1 ST LEVEL COMMON ASSOCIATIONS (%)
APPLE	54	65	42 to 94
STOP	47	62	35 to 88
MEDICAL	47	60	36 to 84
SENTENCE	47	54	27 to 89
MUSIC	45	49	16 to 81
KNOT	44	53	32 to 80
FROG	42	50	16 to 89
THUMBS UP	42	49	20 to 72
THUMBS DOWN	38	44	20 to 100
INTERJECTION	37	47	25 to 79
WANTED	32	43	24 to 73
RETURN	31	36	17 to 86

Table 4-4 indicates that for the average percentage of commonality (calculated from the percentages of the 1st, 2nd and 3rd level common associations across questions per icon), marginal differences were found between the icons. The APPLE icon achieved the highest percentage of commonality as well as the highest average percentage for all the 1st level common associations, followed by the STOP, MEDICAL and SENTENCE icons (>47%). The INTERJECTION, WANTED, and RETURN icons achieved the lowest average percentages of commonality (<37%). The variance between these icons is evident and it seems that some icons achieved better in terms of the percentages of commonality they elicited. This might be a reflection of the applicability of these icons’ associations to the South African population.

4.3 DISCUSSION OF EACH ICON'S ASSOCIATION PERFORMANCE AND A COMPARISON OF THE ELICITED ICONS WITH UNITY™

Every icon will now be discussed in terms of its average percentage of commonality, and the average percentage of the 1st level common associations. The elicited associations will be compared with the current Unity™ vocabulary on two levels (as described in Chapter 3). Firstly, the percentage of agreement between the *words* used to describe associations in this study and the current Unity™ vocabulary was scrutinized. When less than 15 % of the current vocabulary items were communal to both lists, the agreement was seen as restricted; when 16 - 30 % words were found to be communal, agreement was rated as limited; moderate agreement was constituted by between 31 and 50 % communal words, and above 50 % was deemed an acceptable percentage of agreement for compliance with the law for minimal learning. This requirement was established arbitrarily and clinicians might want to increase the required percentage, as this implies that 50 % of the vocabulary would still have to be learnt - probably with some effort. Table 4-5 is a summary of the percentage of agreement between the two lists for all the icons.

Table 4-5: Summary of agreement between compared lists

Icon	Amount of similarities	Percentage of agreement (%)
Apple	41 communal words out of 149	28
Stop	6 communal words out of 10	60
Medical	5 communal words out of 25	20
Sentence	3 communal words out of 57	5
Music	8 communal words out of 39	21
Knot	1 communal word out of 14	7
Frog	3 communal words out of 11	27
Thumbs up	7 communal words out of 20	35
Thumbs down	3 communal words out of 23	13
Interjection	1 communal word out of 40	3
Wanted	4 communal words out of 10	40
Return	6 communal words out of 27	22

Table 4-5, the results of the 1st level of comparison (comparing words), revealed that in most cases the percentage agreement between the two lists was below 35 %, with only two exceptions (for the STOP and WANTED icons), which achieved agreement of 60 % and 40 % respectively. This indicated that for the majority of icons there were more than 60 % of *vocabulary* items that were not similar. The second level of comparison entailed a comparison in terms of *communal concepts*. This was necessary since investigating the agreement between words only might have been misleading. These results will be discussed for every icon, with focus on recommendations for implementation of these icons for the South African population.

4.3.1 Associations with the APPLE icon

The APPLE icon obtained a 99 % response rate (see Table 4-1), suggesting that participants easily related to this icon. The average for the 1st level common association for the APPLE icon across questions, was the highest of all the icons (65 %), and ranged between 42 % and 94 % (see Tables 4-2 and 4-3). The average for the APPLE icon's first three common associations was 54 % that was also the highest average (see Table 4-2 for a summary of each level's percentage of commonality per question per icon). The different common associations for the APPLE icon are summarized in Appendix F. Table 4-6 portrays a comparison of the elicited associations and current UnityTM vocabulary.

The comparison of the elicited associations with the current UnityTM vocabulary indicated that there was an agreement of 28 %, where 41 of the possible 149 vocabulary items were communal (see Tables 4-5 and 4-6). There were some differences that could be related to differences in contexts and cultures, as well as world knowledge that could have an impact on the learnability of the APPLE icon. As this icon has a high percentage of commonality, it seems that it might be relatively easy to learn, as most of the participants were able to relate to the icon and make associations similar to the current associations included in UnityTM (Luftig and Bersani, 1985; Paivio, 1986, Schlosser, 1994).

A comparison of communal concepts indicated that, as in the current UnityTM vocabulary, the associations elicited in this study mostly referred to food-related items. It follows that South Africans wanting to use UnityTM might be able to expand their vocabulary to include the vocabular adopted in UnityTM with relatively little effort, adhering to the laws of minimal learning and minimal energy. However, culturally appropriate food-items might need to replace items in the current UnityTM vocabulary - like *ketchup*, *rigatoni*, *tortellini*, *refried beans*, *burrito*, *salsa*, *taco*, *enchilada*, *ravioli*, *linguini*, *bologna*, *cracker*, *pretzel* - as many of these items and/or their labels are unknown to the average South African. Items like *pap*, *potjiekos*, *atjar*, *chakalaka*, *chips*, *bunny chow*, *vetkoek*, *tomato sauce*, *braai*, *kebab*, and *stirfry*, might replace the said items. Many of the suggested words are taken from different South African languages, but - as in other parts of the world - these have become commonly used across the range of cultures and languages in the country.

Table 4-6: Comparison of associations with APPLE icon elicited in this study and the current Unity™ vocabulary

Associations elicited in this study only			Communal words		Associations included in the current Unity versions only		
♦ construct the theory of gravity	♦ munch	♦ chopped*	♦ apple	♦ peach	♦ egg	♦ pasta	♦ order*
♦ peel*	♦ crack	♦ baked*	♦ bite*	♦ pear	♦ butter	♦ snack	♦ set*
♦ use as weapon	♦ ah	♦ grated*	♦ chew*	♦ pineapple	♦ cracker	♦ bagel	♦ plow*
♦ mothers	♦ nice	♦ rotten*	♦ eat*	♦ strawberry	♦ crisp(UK)/potato chip(US)	♦ bread	♦ teatime
♦ Newton	♦ smacking lips	♦ squashed*	♦ taste*	♦ tomato	♦ nut	♦ cereal	♦ tractor
♦ people on a diet	♦ eeeuuu worm!	♦ small blocks	♦ ice cream	♦ candy	♦ popcorn	♦ oatmeal(US)/porridge(UK)	♦ broccoli
♦ healthy^	♦ “I’m hungry”	♦ cut*	♦ pie	♦ sauce	♦ pretzel	♦ rice	♦ brussels sprout
♦ herbivores	♦ “An apple a day keeps the doctor away”	♦ ice cream	♦ food	♦ anyone	♦ sandwich	♦ toast	♦ cabbage
♦ round^		♦ fruit salad	♦ fruit	♦ salad	♦ biscuit(UK)/cookie(US)	♦ waffle	♦ carrot
♦ sphere	♦ nutrition	♦ cinnamon	♦ delicious^	♦ cheese	♦ cake	♦ angel hair	♦ cauliflower
♦ circle	♦ nourishment	♦ apple tart	♦ hungry*	♦ pork	♦ cupcake	♦ fettucini	♦ celery
♦ heart-shaped	♦ essential	♦ toffee	♦ sour^	♦ salt	♦ custard(UK)/pudding(US)	♦ linguini	♦ chips(UK)/french fries (US)
♦ oval	♦ vitamins	♦ syrup	♦ vegetable	♦ pancake	♦ doughnut	♦ macaroni	♦ corn
♦ off-round	♦ minerals	♦ refreshments	♦ sweet^	♦ red	♦ bacon	♦ noodle	♦ cucumber
♦ voluptuous	♦ balanced diet	♦ cream	♦ apple	♦ yum	♦ beef	♦ pizza	♦ lettuce
♦ fibre	♦ tasty^	♦ pie	♦ banana	♦ sugar	♦ bologna	♦ ravioli	♦ mushroom
♦ water	♦ thirsty^	♦ worm	♦ cherry	♦ yogurt	♦ cheeseburger	♦ rigatoni	♦ onion
♦ tree	♦ portable^	♦ content	♦ grape	♦ chocolate	♦ chicken	♦ shell	♦ pea
♦ grow*	♦ common	♦ satisfied	♦ grow*	♦ horse	♦ ham	♦ spaghetti	♦ tortellini
♦ shops	♦ juicy^	♦ energised	♦ anybody		♦ hamburger	♦ honey	♦ potato
♦ Pick ‘n Pay	♦ fruity^	♦ enjoy	♦ orange		♦ hot dog	♦ jam(UK)/jelly(US)	♦ spinach
♦ cafeteria	♦ pips	♦ fulfilled			♦ pepperoni	♦ ketchup	♦ any time
♦ market	♦ twig	♦ good^			♦ sausage	♦ mayonnaise	♦ anyhow
♦ green grocers	♦ branch	♦ great^			♦ steak	♦ mustard	♦ anymore
♦ fruit markets	♦ leaves	♦ happy^			♦ turkey	♦ oil	♦ anything
♦ kitchen	♦ naartjie	♦ refreshed*			♦ butterscotch	♦ peanut butter	♦ anyway
♦ fridge	♦ mango	♦ relieved*			♦ vanilla	♦ salad dressing	♦ anywhere
♦ crunch	♦ juice	♦ non-fattening			♦ cereal and grain	♦ pepper	♦ crisp
	♦ canned*				♦ condiment	♦ vinegar	♦ lime
	♦ puree				♦ dairy product	♦ bean	♦ kiwi
					♦ flavour	♦ drool	♦ berry
					♦ meat	♦ enchilada	♦ melon
					♦ Mexican food	♦ taco	♦ plum
					♦ refried beans	♦ beet	♦ pumpkin
					♦ salsa	♦ cheek	♦ burrito
					♦ menu		♦ nacho
					♦ letter		

* word is found in all the different verb-forms, including “verb”, “verb + s”, “verb + ed”, “verb + en”, “verb + ing”, “to + verb”

^ word is found in all the different adjective forms, including “adjective”, “adjective + er”, “adjective + est”

4.4.2 Associations with the STOP icon

The STOP icon's percentages for the 1st level common associations ranged between 35 % and 88 %, with an average percentage of 62 % (see Tables 4-2 and Table 4-3). The average percentage of commonality was among the highest (47 %). Table 4-7 is a summary of the similarities and differences between the elicited association list and the current UnityTM vocabulary.

Table 4-7: Comparison of associations with STOP icon elicited in this study and those in the current UnityTM vocabulary

Associations elicited in this study only	Communal words	Vocabulary included in the current Unity vocabulary only
<ul style="list-style-type: none"> ♦ road sign ♦ traffic ♦ brake ♦ slow down ♦ regulate traffic ♦ prevent disasters ♦ road users ♦ cyclists ♦ motorists ♦ octagonal ♦ white ♦ metal ♦ steel ♦ traffic department 	<ul style="list-style-type: none"> ♦ red ♦ stop ♦ wait ♦ stop sign ♦ word ♦ letter 	<ul style="list-style-type: none"> ♦ bleed ♦ spell ♦ embarrass ♦ dictionary

* word is found in all the different verb-forms, including “verb”, “verb + s”, “verb + ed”, “verb + en”, “verb + ing”, “to + verb”

^ word is found in all the different adjective forms, including “adjective”, “adjective + er”, “adjective + est”

Table 4-7 indicates that 6 of the 10 UnityTM vocabulary items were communal, thus 60 % agreement (also see Table 4-5). The concept of stopping and waiting featured in both lists, but the elicited list focused more on traffic-related concepts. The stop sign (referent) is a widely used and well-known item in all parts of the country and this icon could therefore be familiar to most South Africans. As this icon included 60 % of the vocabulary suggested in the current UnityTM vocabulary list, this icon seems to be highly relevant to the South African context. As the suggested vocabulary lists from UnityTM for the STOP-icon were limited in comparison with other icons, one could assume that the creators meant for this icon to be largely customized in terms of the different activities that a VOCA-user might want stopped. However, this icon might be used in the South African context to encode vocabulary that is relevant to traffic and transport, in addition to messages that enables the VOCA-user to stop or delay activities.

4.4.3 Associations with the MEDICAL icon

The MEDICAL icon achieved among the top three icons in terms of the average percentage of commonality for the 1st level association, with 60 %, ranging between 36 % and 84 % (see Tables 4-2 and 4-3). The MEDICAL icon's average percentage of commonality was 47 %.

Table 4-8 depicts the comparison of the current Unity™ vocabulary and the elicited associations.

Table 4-8: Comparison of associations with the MEDICAL icon elicited in of this study and the current Unity™ vocabulary

Associations elicited in this study only			Communal words	Vocabulary included in the current Unity vocabulary only
<ul style="list-style-type: none"> ♦ ambulance ♦ hospital ♦ Medicross ♦ vehicle ♦ car ♦ emergency vehicle ♦ doctor ♦ nurse ♦ clinic ♦ square ♦ red^ ♦ white^ ♦ blue^ ♦ metal ♦ steel ♦ roads ♦ heart attack ♦ siren ♦ whaling ♦ alarm ♦ Volkswagen ♦ Venture ♦ taxi ♦ Ferrari ♦ bus ♦ uniform ♦ anxious^ 	<ul style="list-style-type: none"> ♦ injured* ♦ emergencies ♦ accidents ♦ patients ♦ need assistance ♦ transport to hospital ♦ ouch! ♦ Oh no! ♦ crash* ♦ rapid^ ♦ pain* ♦ save lives ♦ rush* ♦ curiosity ♦ brakes ♦ doors ♦ engine ♦ seats ♦ aeroplanes ♦ army ♦ helicopters ♦ light house tower ♦ bakkie ♦ afraid^ ♦ depressed* ♦ assured^ ♦ heroic 	<ul style="list-style-type: none"> ♦ urgent^ ♦ hurry* ♦ rescue* ♦ paramedic ♦ transport ♦ steering wheel ♦ tyres ♦ windows ♦ hooter ♦ oxygen tank ♦ stretcher ♦ first-aid ♦ bed ♦ Audi ♦ BMW ♦ undertaker vehicle ♦ police car ♦ Ford ♦ fire truck ♦ tow truck ♦ kombi ♦ racing car ♦ van ♦ drip ♦ resuscitation ♦ calm^ ♦ curious^ 	<ul style="list-style-type: none"> ♦ ill^ ♦ sick* ♦ help* ♦ hurt* ♦ medicine 	<ul style="list-style-type: none"> ♦ breath ♦ breathe ♦ sunburn* ♦ healthy^ ♦ drool* ♦ burn* ♦ ache* ♦ sneeze* ♦ throat lozenge ♦ aspirin ♦ therapist ♦ therapy ♦ delicious^ ♦ pasta ♦ please get my mommy ♦ I need a tissue ♦ I need help ♦ cough syrup ♦ bandage (US)/plaster (UK) ♦ bleed

* Word is found in all the different verb-forms, including “verb”, “verb + s”, “verb + ed”, “verb + en”, “verb + ing”, “to + verb”

^ Word is found in all the different adjective-forms, including “adjective”, “adjective + er”, “adjective + est”

Table 4-8 indicates that 5 of the 25 vocabulary items were communal, thus a 20 % agreement (see Table 4-5). The MEDICAL icon elicited concepts that were mostly automobile-related, but also included some medical-related concepts. However, the elicited associations focused more on acute medical emergencies, like those handled by an ambulance (see Table 4-8). The automobile-related concepts did not feature so strongly in Unity™ vocabulary, possibly due to the difference in the icons: on the UniChat overlay the MEDICAL icon is a representation of the medical sign printed on an ambulance, where the Unity™ 128 overlay makes use of the medical sign only. It does, however, seem that the ambulance is conducive to more medical-related associations, as the comparison clearly indicates. The researcher postulates that, as the medical sign is not that familiar in the South African context, making use of the medical sign printed on the ambulance might be more association-rich than using only the medical sign.

4.4.4 Associations with the SENTENCE icon

The SENTENCE icon’s percentages of commonality for the 1st level association ranged between 27 and 89 % , averaging at 54 % (see Table 4-2 and 4-3). The SENTENCE icon’s average percentage of commonality was 47 % . Table 4-9 provides a summary of

associations elicited for the SENTENCE icon in this study as well as the associations included in the current Unity™ vocabulary.

Table 4-9: Comparison of associations with the SENTENCE icon elicited in this study and the current Unity™ vocabulary

Associations elicited in this study only			Communal words	Vocabulary included in the current Unity only	
♦ conversation	♦ tongue	♦ hair	♦ hello	♦ {jokes}	♦ What did you do last night?
♦ communication	♦ eyes	♦ hand	♦ how do you do?	♦ I want to play a game	♦ What do you want to do now?
♦ talking*	♦ fingers	♦ head	♦ good-bye	♦ I'm fine	♦ Who asked you?
♦ speaking*	♦ body	♦ legs		♦ I'm not so good	♦ You told one
♦ speech	♦ language	♦ limbs		♦ Is that cool or what?	♦ You're crazy
♦ boy	♦ thoughts	♦ lips		♦ Isn't that special	♦ Are you busy right now?
♦ girl	♦ throat	♦ lungs		♦ Leave me alone	♦ Bug off
♦ man and woman	♦ social clubs	♦ mammary glands		♦ May I have a drink please	♦ Can I get out of my chair?
♦ two	♦ universities	♦ mind		♦ My ... hurts	♦ Excuse me
♦ swearing*	♦ airports	♦ mouth		♦ My address is ...	♦ Get it?
♦ socialise*	♦ argument	♦ mumbling		♦ My name is ...	♦ Get off my back
♦ build relationships	♦ greetings	♦ e-mail		♦ My phone number is ...	♦ See you later
♦ laugh*	♦ I love you	♦ SMS		♦ Nice meeting you	♦ Hi, how are you?
♦ relate*	♦ cool	♦ smoke signals		♦ Oh brother!	♦ Hi, what's up?
♦ interact*	♦ conversatio n	♦ telephonic conversations		♦ Please get my mommy	♦ I am so happy
♦ interpret*	♦ exclamation	♦ letters		♦ Please let me know if you don't understand my voice	♦ I don't get it
♦ convince*	♦ groans	♦ sign language		♦ Pledge of Allegiance	♦ I don't feel well
♦ humans	♦ damn baby	♦ body language		♦ Tell another one	♦ I don't know
♦ people	♦ alphabet	♦ speeches		♦ That's a good one	♦ I don't like that
♦ literature	♦ phonetics	♦ senses		♦ That's dumb	♦ I don't think so
♦ social skills	♦ consonants	♦ telepathy		♦ That's not what I meant	♦ I don't want to
♦ listeners	♦ vowels	♦ questions		♦ That's ridiculous	♦ I need a tissue
♦ cartoonists	♦ diphthongs	♦ good^		♦ This device let's me speak like anyone else	♦ I need help
♦ homosexual	♦ cocktail noise	♦ great^		♦ This is so boring	♦ I want to play a game
♦ big^	♦ music	♦ nice		♦ Wanna hear a secret?	♦ I'm feeling ... sentence
♦ small^	♦ whistles	♦ satisfied*		♦ What are we going to do?	
♦ teenager	♦ express*	♦ relaxed*			
♦ faces	♦ request*	♦ wonderful			
♦ words	♦ story	♦ O.K.			
♦ oval	♦ speech bubble	♦ important			
♦ square	♦ paragraph	♦ worthwhile			
♦ sentence	♦ joke	♦ fulfilled			
♦ white	♦ nouns	♦ comfortable			
♦ black	♦ syllables	♦ cheered up			
♦ sounds	♦ arms	♦ at ease			
♦ percentages	♦ body	♦ appreciative			
♦ tones	♦ alive	♦ ears			

* word is found in all the different verb-forms, including “verb”, “verb + s”, “verb + ed”, “verb + en”, “verb + ing”, “to + verb”

^ word is found in all the different adjective forms, including “adjective”, “adjective + er”, “adjective + est”

Table 4-9 indicates that 3 of the 57 Unity™ vocabulary items were communal to both lists, thus 5 % agreement. However, this might be a misrepresentation, as there were similarities between the semantic fields of the two lists, e.g. the elicited associations mentioned only a few interactional phrases, but they responded to the cueing questions with words from the same semantic fields (e.g. *communicate*, *conversation*, *talking*, *interact*, *build relationships*, etc.). One might deduce that although the South African participants did not provide the actual interactional phrase as in the current Unity™ vocabulary, they might be able to learn more of the interactional phrases with relatively little effort, as they do associate this icon with interaction and communication. The elicited associations also included concepts like different types of communication (*smoke signals*, *body language*, *speech*, *e-*

mail, SMS, telephonic conversations, sign language), body parts (*mouth, face, tongue, eyes, ears*), places where communication is frequently seen and heard (*social clubs, airports, universities*), different functions of communication and interaction (*request, convince, relate, interact, build relationships*) and so forth.

The South African users of Minspeak™-based VOCAs might be able to easily learn the vocabulary included in the current Unity™, as the majority of concepts in Unity™ would probably be familiar to them, so that the laws of minimal learning and minimal effort would not be violated. However, some of the vocabulary items might need to be replaced with context and/or culturally congruent words, e.g. items like the Pledge of Allegiance is not applicable to the South African context.

4.4.5 Associations with the MUSIC icon

The 1st level associations' commonality for the MUSIC icon ranged between 16 % and 91 %, with an average of 49 % (see Table 4-1). The average percentage of commonality for the MUSIC-icon was 45 %. The elicited associations resembled the current Unity™ vocabulary to some extent, in terms of the types of concepts associated with the MUSIC icon (see Table 4-10 for more details).

Table 4-10 indicates that there was 21 % agreement (8 of the 39 vocabulary items were communal). A comparison of the two lists with regard to communal concepts reveals that various music-related concepts were communal, including songs and musical instruments. The South African participants identified various musical instruments (e.g. *accordion, organ*), different kinds of music (e.g. *jazz, disco, hip-hop, rap, rave, techno*), as well as some perceived functions of music (including *dance, relax, listen, compose, buy, sing*). No song name was elicited, contrary to the current Unity™ vocabulary. However, as the elicited associations were from the same semantic field, the researcher suggests that the titles of typical South African songs might be learnt in connection with and encoded by the MUSIC icon, with relatively little effort.

Table 4-10: Comparison of associations with the MUSIC icon elicited in this study and current Unity™ vocabulary

Associations elicited in this study only			Communal words	Vocabulary included in the current Unity only
<ul style="list-style-type: none"> ♦ symbols ♦ buy* ♦ compose* ♦ dance* ♦ enjoy* ♦ listen* ♦ interpret* ♦ masterpiece ♦ play* ♦ write* ♦ art ♦ culture ♦ entertainment ♦ musicians ♦ fans ♦ choirs ♦ ad companies ♦ ministers ♦ singers ♦ pianists ♦ song writers ♦ small^ ♦ circles ♦ lines ♦ black ♦ paper ♦ ink ♦ soothing ♦ books ♦ stores ♦ church hymn ♦ books ♦ jarring ♦ modern 	<ul style="list-style-type: none"> ♦ clubs ♦ compositions ♦ concerts ♦ keyboard ♦ MTV ♦ radio ♦ stationary ♦ tape recorders ♦ 16th to 19th century pictures and posters ♦ clapping hands ♦ bravo! ♦ bird songs ♦ do re me fa so la ti do ♦ encore! ♦ orchestra ♦ opera ♦ tadatadatada ♦ voices ♦ whistling ♦ calm* nerves ♦ excite* ♦ hobby ♦ relax* ♦ alphabet letters ♦ classical ♦ disco ♦ jazz ♦ electronic ♦ hip-hop ♦ depressed ♦ memorized* ♦ reminiscing* 	<ul style="list-style-type: none"> ♦ rap ♦ rave ♦ techno ♦ wood ♦ iron ♦ organ ♦ golf club ♦ accordian ♦ decibels ♦ hieroglyphics ♦ hockey sticks ♦ lolypop ♦ poems ♦ spears ♦ stories ♦ G-key ♦ metal ♦ chocolates ♦ conductor ♦ natives ♦ parties ♦ treble and bass ♦ cleft signs ♦ Mozart ♦ poetry in music ♦ peaceful ♦ inspired* ♦ happy ♦ great^ ♦ sophisticated ♦ stimulated* ♦ wonderful ♦ competent ♦ pop 	<ul style="list-style-type: none"> ♦ sing ♦ music ♦ piano ♦ musical instrument ♦ music synthesizer ♦ guitar ♦ song ♦ sound 	<ul style="list-style-type: none"> ♦ more^ ♦ cassette tape ♦ album ♦ CD ♦ cymbal ♦ drum ♦ bell ♦ tambourine ♦ triangle ♦ mostly ♦ Twinkle twinkle little star ♦ What child is this? ♦ We wish you a merry Christmas ♦ drum ♦ cymbal ♦ rest ♦ anymore ♦ repeat* ♦ beat ♦ no more ♦ Angels we have heard on high ♦ Away in a manger ♦ Baa baa black sheep ♦ Bingo ♦ Jingle bells ♦ Joy to the world ♦ London Bridge ♦ Mary had a little lamb ♦ Oh holy night ♦ Old McDonald had a farm ♦ Silent night

* word is found in all the different verb-forms, including “verb”, “verb + s”, “verb + ed”, “verb + en”, “verb + ing”, “to + verb”
 ^ word is found in all the different adjective forms, including “adjective”, “adjective + er”, “adjective + est”

4.4.6 Associations with the KNOT icon

The average percentage of commonality for the KNOT icon’s 1st level associations, was calculated at 52 % with a range of between 32 % and 80 % (see Tables 4-2 and 4-3). The percentage of commonality for the KNOT icon averaged at 54 %. Table 4-11 is a summary of the comparison between the elicited association list and the current Unity™ vocabulary.

Only one word (of a possible 14 vocabulary items) was found to be communal, thus 7 % agreement between the compared lists. When the current Unity™ vocabulary list for the KNOT icon was investigated, the list consisted of only a few concepts - specifically the concept of negation or “not-ness”. This concept is, however, used in a wide variety of phrases like *I/you/he/she/they will not, would not, cannot, could not, have not, had not, has not, do not, did not, should not, might not, must not*, etc. Yet, in the elicited association set, concepts related to the different uses and users of a rope were prominent (see Table 4-11).

Table 4-11: Comparison of associations with the KNOT icon elicited in this study and those in the current Unity™ vocabulary

Associations elicited in this study only			Communal words	Vocabulary included in the current Unity only
<ul style="list-style-type: none"> ♦ rope ♦ knot ♦ tied* ♦ bind* together ♦ pull* ♦ drag* ♦ hoist* ♦ equipment ♦ mountain climbing gear ♦ tools ♦ hardware ♦ materials ♦ campers ♦ farmers ♦ mountaineers ♦ executioner ♦ killers ♦ rescue workers ♦ Voortrekkers ♦ transport companies ♦ fishermen 	<ul style="list-style-type: none"> ♦ long^ ♦ cylindric ♦ fibre ♦ cotton ♦ nylon ♦ art shop ♦ stationary shop ♦ hardware store ♦ tree house ♦ ships ♦ harbour ♦ garden ♦ playgrounds ♦ garages ♦ workshops ♦ death row ♦ groan* ♦ grunting ♦ grrr ♦ uhh ♦ out of breath ♦ scream ♦ thin^ 	<ul style="list-style-type: none"> ♦ cry of distress ♦ fasten ♦ tow ♦ end ♦ beginning ♦ number 8 keys ♦ loop ♦ sewing cotton ♦ wool ♦ ribbons ♦ elastic ♦ chain ♦ hose pipe ♦ leather strips ♦ riempies ♦ wire ♦ fishing line ♦ sticks ♦ horse ♦ nets ♦ wood ♦ thick^ 	<ul style="list-style-type: none"> ♦ brown 	<ul style="list-style-type: none"> ♦ not ♦ did not ♦ should not ♦ could not ♦ would not ♦ do not ♦ will not ♦ shall not ♦ might not ♦ must not ♦ have not ♦ has not ♦ had not

* word is found in all the different verb-forms, including “verb”, “verb + s”, “verb + ed”, “verb + en”, “verb + ing”, “to + verb”
 ^ word is found in all the different adjective forms, including “adjective”, “adjective + er”, “adjective + est”

The necessity of this icon in Unity™ is questioned with regards to its use on a more advanced overlay with limited space, as it does not seem space effective. The prestored messages coded by the KNOT icon could, for instance, be coded by another icon like the WRONG-icon (an icon not included in this study), thus making more effective use of the already limited space on an overlay.

4.4.7 Associations with the FROG icon

The average for the FROG icon’s 1st level associations was 50 %, ranging between 16 % and 89 %. The average percentage of commonality for the FROG icon was 42 % (see Tables 4-2 and 4-3). Table 4-12 is a summary of the comparison between the elicited associations and the current Unity™ vocabulary. As can be seen in Table 4-12 the elicited association list had a 27 % agreement with the current Unity™ vocabulary list, viz. 3 of the 11 possible vocabulary items (also see Table 4-5). Comparing the two lists on a conceptual level, relatively little similarities were found, as the elicited association list revolved around body parts (e.g. *arms, legs, throat, eyes, tongue, head, etc.*), disgusted utterances (e.g. *yuck!, eek!, etc.*) and amongst others, animals and aspects of nature (e.g. *reptiles, herbivores, snakes, amphibians, etc.*). The suggested Unity™ vocabulary for this icon is limited in relation to icons like APPLE or SENTENCE, as it only includes concepts of rushing, length, and going. It is suggested that this vocabulary list be expanded substantially, to make efficient use of space on the overlay.

Table 4-12: Comparison of associations with the FROG icon elicited in this study and the current Unity™ vocabulary

Associations elicited in this study only			Communal words	Vocabulary included in Unity only
<ul style="list-style-type: none"> ♦ leap* ♦ admire* ♦ watch* ♦ leave it alone ♦ let it be ♦ avoid* ♦ pet ♦ animals ♦ amphibians ♦ toads ♦ nature ♦ French ♦ little boys ♦ veterinarians ♦ witches ♦ biology teachers ♦ snakes ♦ storks ♦ herbivores ♦ birds ♦ arrow head ♦ frog-shaped ♦ round ♦ green ♦ slimy ♦ wet lands ♦ ponds ♦ rivers ♦ swamps ♦ dams ♦ freshwater lakes ♦ feet 	<ul style="list-style-type: none"> ♦ marine systems ♦ mud ♦ near moist areas ♦ pools ♦ veldt ♦ outside ♦ lush green surroundings ♦ creeks ♦ vlei ♦ croaking ♦ blurb ♦ yuck! ♦ screaming ♦ aaah! ♦ disgusted ♦ eek! ♦ biological experiments ♦ anatomy ♦ dissect* ♦ arms ♦ body ♦ butt ♦ head ♦ throat ♦ tongue ♦ toes ♦ warts ♦ legs ♦ mouth ♦ skin 	<ul style="list-style-type: none"> ♦ nose ♦ nostrils ♦ eyes ♦ ears ♦ brains ♦ intestines ♦ reptiles ♦ snakes ♦ newts ♦ gecko's ♦ crocodiles ♦ bull frog ♦ platanna ♦ terrapin ♦ eggs ♦ tadpole ♦ French cuisine ♦ chips ♦ fruits ♦ garlic ♦ butter ♦ sauce ♦ salt ♦ mayonnaise ♦ mushrooms ♦ bad ♦ contempt ♦ dirty ♦ disgust ♦ dislike ♦ gross ♦ neck 	<ul style="list-style-type: none"> ♦ frog ♦ jump* ♦ green^ 	<ul style="list-style-type: none"> ♦ belong ♦ sudden^ ♦ excited^ ♦ stretch* ♦ long^ ♦ go* ♦ hurry* ♦ rush*

* word is found in all the different verb-forms, including “verb”, “verb + s”, “verb + ed”, “verb + en”, “verb + ing”, “to + verb”
^ word is found in all the different adjective forms, including “adjective”, “adjective + er”, “adjective + est”

4.4.8 Associations with the THUMBS UP icon

The average percentage of commonality 1st level common associations for the THUMBS UP icon was 49 % and ranged between 20 % and 72 % (see Tables 4-2 and 4-3). This icon’s average percentage of commonality was 42 %. A summary of the comparison between the elicited associations and the current Unity™ vocabulary is provided in Table 4-13. Table 4-13 indicates that there was 35 % agreement between the two words lists, where 7 of the possible 20 vocabulary items were communal. When comparing the lists on a conceptual level, it appears that the main concepts of the icon, i.e. positive/affirmative/”up-ness”, did feature in the elicited association list. This icon might be used to encode words from the same semantic field for South African VOCA users, as these vocabulary items might be more familiar and subsequently might be learnt with relatively little effort. However, words from different African languages that are generally used across cultures, genders and languages should be included, like *yebo*, *yes*, *êê*, *lekker*, *sharp*, *yebo gogo*, etc.

Table 4-13: Comparison of associations with the THUMBS UP icon elicited in this study and the current Unity™ vocabulary

Associations elicited in this study only			Communal words	Vocabulary included in Unity only
<ul style="list-style-type: none"> ♦ hand ♦ fist ♦ all right ♦ affirmative ♦ excellent^ ♦ approve* ♦ praise* ♦ write* ♦ work* ♦ hitch hike* ♦ precision hand work ♦ body parts ♦ signs ♦ symbols ♦ body language ♦ visual communication ♦ pedestrians ♦ scuba divers ♦ people without transport 	<ul style="list-style-type: none"> ♦ air force personnel ♦ flesh ♦ white ♦ green ♦ bone ♦ blood ♦ arm ♦ limb ♦ yebo ♦ yes ♦ êê ♦ O.K. ♦ fine ♦ sharp ♦ wonderful ♦ compliment ♦ encourage* ♦ well done ♦ fingers ♦ content 	<ul style="list-style-type: none"> ♦ fingerprints ♦ tentacles ♦ thumb ♦ nails ♦ palm ♦ jacket ♦ upwards ♦ feet ♦ leg ♦ toes ♦ goodbye ♦ signaling a taxi ♦ claws ♦ mutated ♦ brain ♦ skin ♦ gratitude ♦ lekker ♦ happy ♦ positive ♦ comfortable 	<ul style="list-style-type: none"> ♦ good^ ♦ great^ ♦ agree* ♦ lift* ♦ smile* ♦ thumbs up ♦ correct^ 	<ul style="list-style-type: none"> ♦ true^ ♦ tight^ ♦ win* ♦ loud^ ♦ tall^ ♦ near^ ♦ open* ♦ accept* ♦ warm^ ♦ suck* ♦ sweet ♦ pudding ♦ expensive^

* word is found in all the different verb-forms, including “verb”, “verb + s”, “verb + ed”, “verb + en”, “verb + ing”, “to + verb”

^ word is found in all the different adjective forms, including “adjective”, “adjective + er”, “adjective + est”

4.4.8 Associations with the THUMBS DOWN icon

The THUMBS DOWN icon’s average percentage of commonality for the 1st level association was 48 % and ranged between 20 % and 100 % (see Tables 4-2 and 4-3). The THUMBS DOWN icon’s average percentage of commonality was 38 %. Table 4-14 is a summary of the comparison between the elicited associations and the current Unity™ vocabulary. This comparison was done to determine the probable familiarity of participants with concepts and vocabulary, and to which extent they would have to exert energy to learn it (compliance with laws of minimal learning and minimal energy).

Table 4-14 indicates that an agreement of 13 % prevailed for this icon, where only 3 of the 23 possible vocabulary items were communal (also see Table 4-5). An investigation into communal concepts revealed that the concepts of negativity and the status of “down-ness” were common to both lists. However, the elicited associations also included different body parts, a list of race-related colours, hand-users and a multitude of hand-uses and activities where hands are involved.

Table 4-14: Comparison of associations with the THUMBS DOWN icon elicited in this study and the current Unity™ vocabulary

Associations elicited in this study only			Communal words	Vocabulary included in the current Unity only
<ul style="list-style-type: none"> ♦ thumbs down ♦ hand sign ♦ no ♦ bad luck ♦ low value ♦ wrong ♦ hitch-hiker ♦ kettle ♦ disapprove ♦ criticise* ♦ dislike* ♦ press a button ♦ pick up ♦ point* ♦ wave* ♦ write* ♦ hitch-hike ♦ change my luck ♦ body parts ♦ limbs ♦ gestures ♦ sign language ♦ hand signs ♦ non-verbal ♦ transport ♦ no thanks ♦ not good 	<ul style="list-style-type: none"> ♦ rugby ♦ sport coaches ♦ Roman Emperors ♦ colloquial communicators ♦ humans ♦ big ♦ hand-sized ♦ small ♦ fist ♦ flesh ♦ other race-related colours (including black, brown, white, red, etc.) ♦ skin ♦ bone ♦ nail ♦ blood ♦ muscles ♦ hair ♦ cells ♦ arm ♦ hand ♦ no mercy ♦ boo 	<ul style="list-style-type: none"> ♦ chopping ♦ clapping hands ♦ wave* ♦ finger snap ♦ I need a lift please ♦ taxi please ♦ decrease* ♦ disgust* ♦ fingers ♦ fingerprints ♦ thumb ♦ knuckles ♦ palm ♦ wrist ♦ sleeve ♦ arm ♦ forearm ♦ feet ♦ big toe ♦ toes ♦ gloves ♦ angry^ ♦ mad^ ♦ sad^ ♦ negative ♦ catch ♦ Gladiators 	<ul style="list-style-type: none"> ♦ bad^ ♦ disagree* ♦ frown* 	<ul style="list-style-type: none"> ♦ naughty^ ♦ ugly^ ♦ false^ ♦ loose^ ♦ difficult^ ♦ quiet^ ♦ short^ ♦ far^ ♦ close* ♦ drop* ♦ reject* ♦ cool^ ♦ blow* ♦ empty^ ♦ sour^ ♦ dirty^ ♦ inexpensive^ ♦ disappoint* ♦ disappointment ♦ lie*

* word is found in all the different verb-forms, including “verb”, “verb + s”, “verb + ed”, “verb + en”, “verb + ing”, “to + verb”
 ^ word is found in all the different adjective forms, including “adjective”, “adjective + er”, “adjective + est”

The THUMBS DOWN icon’s elicited associations were also compared with those of the THUMBS UP icon as found in Unity™, where the THUMBS UP icon constitutes the positive version of words and concepts, while the THUMBS DOWN icon is used for encoding of the negative version. This phenomenon also appeared in the elicited association list to some extent, including words like *approve/disapprove*, *yes/no*, *correct/wrong*, *praise/criticise*, *positive/negative*, *agree/disagree*, *good/bad*, *smile/frown*, *thumbs up/thumbs down*, etc. (compare Tables 4-13 and 4-14). It seems likely that the THUMBS DOWN icon’s vocabulary might be learnt with relative ease, as the concepts might be familiar to South African VOCA users.

4.4.10 Associations with the INTERJECTION icon

According to Tables 4-2 and 4-3, the average for the 1st level associations for the INTERJECTION icon was 47 %, ranging between 25 % and 79 %. The INTERJECTION icon’s average percentage of commonality was 37 %. The elicited association list and the current Unity™ vocabulary are compared in Table 4-15.

Table 4-15: Comparison of associations with INTERJECTION icon elicited in this study and those in the current Unity™ vocabulary

Associations elicited in this study only			Communal words	Vocabulary included in Unity only	
♦ Fire works	♦ star-like	♦ smoke	♦ fine	♦ yum	♦ chill out
♦ party	♦ colourful^	♦ sparks		♦ excuse me	♦ oh
♦ city	♦ multi-coloured	♦ cherry bombs		♦ thank you	♦ hi
♦ buildings	♦ neon colours	♦ flares		♦ Happy	♦ hello
♦ stars	♦ beautiful^	♦ crackers		♦ Valentine's Day	♦ let's
♦ explosion	♦ pretty^	♦ jack-in-a-box		♦ Happy	♦ eek!
♦ amaBokoBoko	♦ dazzling	♦ nuclear		♦ Hanukah	♦ surprise
♦ winning	♦ bang	♦ explosion		♦ Happy	♦ yeah
♦ amaze*	♦ fuse	♦ 21 st parties		♦ Thanksgiving	♦ awesome
♦ celebrate*	♦ magic	♦ radio		♦ Happy Easter	♦ ha ha ha
♦ crash*	♦ gunpowder	♦ party hats		♦ Happy Fourth	♦ yuck
♦ festivity	♦ whistles	♦ ship at sea		♦ of July	♦ okay
♦ Guy Fawkes	♦ extravagant^	♦ amazement		♦ Merry	♦ good-bye
♦ New Year	♦ Disneyland	♦ amusement		♦ Christmas	♦ please
♦ special occasion	♦ birthdays	♦ cake		♦ Happy Birthday	♦ oops
♦ entertain*	♦ festivals	♦ danger		♦ Happy New	♦ boo
♦ express* joy	♦ outside	♦ drink		♦ Year	♦ you're welcome
♦ look*	♦ night	♦ fire		♦ Happy	♦ whoa
♦ adventurous^	♦ shops	♦ laughter		♦ Halloween	
♦ Chinese	♦ sky	♦ merriness		♦ ouch	
♦ entertainment	♦ sport events	♦ little black		♦ well	
♦ pyrotechnics	♦ holidays	♦ number		♦ of course	
♦ weapons	♦ wow!	♦ Olde Lange		♦ yikes	
♦ Western world	♦ oooh	♦ Sine		♦ congratulations	
♦ bombs	♦ pop	♦ excited^		♦ sorry	
♦ explosives	♦ Christmas	♦ exhilarated^		♦ ah	
♦ adults	♦ impressive^	♦ great^			
♦ little boys	♦ fun	♦ happy^			
♦ students	♦ flint	♦ like a child			
♦ theme parks	♦ warning in	♦ scared^			
♦ big	♦ English,	♦ uneasy^			
♦ flower-shaped	♦ Spanish and	♦ cautious^			
♦ round	♦ Chinese	♦ enjoy*			
♦ square	♦ headaches	♦ energised*			
♦ above	♦ matches	♦ in			
		♦ ecstatic^			

* word is found in all the different verb-forms, including “verb”, “verb + s”, “verb + ed”, “verb + en”, “verb + ing”, “to + verb”
^ word is found in all the different adjective forms, including “adjective”, “adjective + er”, “adjective + est”

The percentage of agreement was limited for the INTERJECTION icon, as only 1 of a possible 40 vocabulary items were communal to the two compared lists, thus 3 % agreement (see Tables 4-5 and 4-15). When comparing the two lists on a conceptual level, however, there were many communal concepts, thus indicating that the percentage of agreement calculated for words only is a misrepresentation. The elicited concepts for the INTERJECTION icon included concepts like special occasions and celebrations, as well as fireworks-related concepts. The current Unity™ vocabulary list consists of interjections that could be used during interaction. So while the current Unity™ vocabulary list includes messages like “Happy Birthday” and “Happy New Year”, the concepts *birthday* and *New Year* were elicited in this study. This might suggest that as concepts from the same semantic fields were elicited, this icon could be used to encode similar concepts for South African VOCA users, probably without excessive cognitive demands in terms of learning and recalling icon codes and icon sequences. However, words like “Happy Thanksgiving” and “Happy Fourth of July” might have to be replaced by culturally congruent messages like

“Laduma” and “Let’s make a wave”, “Happy Freedom Day”, according to the AAC user’s culture.

4.4.11 Associations with the WANTED icon

The average percentage of commonality for the 1st level associations for the WANTED icon was established at 42 %, ranging between 24 % and 73 % . The average percentage of commonality for the WANTED icon was 32 % (see Table 4-2 and 4-3). Table 4-16 reviews the resemblance between the associations elicited in this study and the current Unity™ vocabulary.

Table 4-16: Comparison of associations with the WANTED icon elicited in this study and those in the current Unity™ vocabulary

Associations elicited in this study only			Communal words	Vocabulary included in Unity only
♦ jail	♦ cement	♦ jail	♦ describe*	♦ want*
♦ prison	♦ stone	♦ fences	♦ glue	♦ abuse*
♦ cells	♦ public places	♦ body parts	♦ ashamed	♦ mean^
♦ convict	♦ shops	♦ tattoo	♦ torso	♦ west
♦ criminal	♦ movies	♦ torso	♦ fire department	♦ pay*
♦ robber	♦ police station	♦ fire department	♦ clinic	♦ I want to play a game
♦ murderer	♦ cities	♦ clinic	♦ town hall	
♦ wanted poster	♦ towns	♦ town hall	♦ pamphlets	
♦ notice	♦ Johannesburg	♦ pamphlets	♦ banners	
♦ fugitive	♦ iron doors	♦ banners	♦ television	
♦ advertisement	♦ lock	♦ television	♦ bandits	
♦ photograph	♦ regret	♦ bandits	♦ embezzlers	
♦ arrest*	♦ huh	♦ embezzlers	♦ thief	
♦ catch*	♦ oh no	♦ thief	♦ Nelson Mandela	
♦ lock* up	♦ phew	♦ Nelson Mandela	♦ flyers	
♦ law enforcement	♦ not again	♦ flyers	♦ on-line	
♦ justice	♦ help needed	♦ on-line	♦ news papers	
♦ law	♦ find*	♦ news papers	♦ radio	
♦ correctional services	♦ locate*	♦ radio	♦ milk cartons	
♦ police	♦ consequences	♦ milk cartons	♦ armed	
♦ crime	♦ reward	♦ armed	♦ security	
♦ square	♦ warn*	♦ security	♦ badge	
♦ block	♦ poster	♦ badge	♦ hand cuffs	
♦ rectangle	♦ caption	♦ hand cuffs	♦ prosecution	
♦ frame	♦ wanted sign	♦ prosecution	♦ punishment	
♦ black	♦ pasted	♦ punishment	♦ guilty	
♦ white	♦ bars	♦ guilty	♦ paper	
	♦ blue	♦ paper		

* word is found in all the different verb-forms, including “verb”, “verb + s”, “verb + ed”, “verb + en”, “verb + ing”, “to + verb”
^ word is found in all the different adjective forms, including “adjective”, “adjective + er”, “adjective + est”

An agreement of 40 % were calculated for the WANTED icon, as 4 of the 10 possible vocabulary items were communal (see Tables 4-5 and 4-16). When comparing the lists on a conceptual level, it became apparent that there were few communal concepts in comparison with other icons like APPLE and INTERJECTION. The current Unity™ vocabulary for the WANTED icon includes the concept of “wanting”, with very few ideas related to the visual features of this icon. This seems contrary to one of the basic Unity™ principles which requires icons to make use of the icons’ visual features, allowing the icon to serve as a cue for message recall. The elicited association list included concepts, words and phrases

connected with the visual features of this icon, including body parts, colours, shapes, public places, different types of criminals, different types of media and means of advertising, etc. (see Table 4-16 for more details).

Ideas for teaching VOCA-users the different vocabulary for this icon, include options like obtaining an actual wanted poster (something that is not very common or easily obtainable in South Africa), and working from there on the whole language approach, making laws, visiting jails, setting and paying fines, etc. - giving users experience of the concepts they have to learn. However, the researcher - although a strong believer in the whole language approach and experience-based learning - is not fully convinced that the users would learn the idea of “wanting” in connection with this icon. Experience with significant others teaching (especially) children the vocabulary for the icon, indicated that they often turn to other pictures to teach the concepts - which, admittedly, often include food items, like ice cream. The results obtained for this icon on all the different levels of the data analysis procedure indicate that users learning the vocabulary and concepts coded with the WANTED icon, might require additional support. This does not necessarily comply with the laws of minimal effort and minimal learning.

4.4.12 Associations with the RETURN icon

The average percentage of commonality for the RETURN icon’s 1st level associations, was the lowest of all the icons (36 %) with 1st level associations percentages ranging between 17 % and 86 %. This icon’s average percentage of commonality was calculated at a low 31 % (see Tables 4-2 and 4-3). These statistics indicate that this icon elicited a wide range of associations with very little commonality. Table 4-17 is a comparison of the associations elicited in this study and the current Unity™ vocabulary. Table 4-17 indicates that there was 22 % agreement, with 6 communal words out of a possible 27 (also see Table 4-5).

A comparison of the concepts included in the lists, revealed that the concepts of turning, roundness and repetition were communal. The RETURN icon elicited common associations with lower average percentages from a wide range, with little commonality in relation to other icons. Learning and teaching this icon’s associations might require additional support material and strategies and would not necessarily comply with the laws of minimal learning and energy.

Table 4-17: Comparison of associations with the RETURN icon elicited in this study and the current Unity™ vocabulary

Associations elicited in this study only			Communal words	Vocabulary included in the current Unity only
<ul style="list-style-type: none"> ♦ aeroplanes circling ♦ arrows ♦ circle ♦ ellips ♦ eternity ♦ hoola hoop ♦ moths around a light ♦ rotation ♦ wheel ♦ air shows ♦ dance* ♦ calculate* volume ♦ drive* ♦ follow* ♦ indicate* direction ♦ recycle* ♦ rhythmic gymnastic routine ♦ run* ♦ travel* ♦ walk* ♦ wear* around neck ♦ abstract object ♦ action group ♦ environment ♦ games ♦ jewelry ♦ motion ♦ nature ♦ road maps ♦ small flying animals ♦ sport ♦ transport ♦ athletes ♦ drivers ♦ exhilarated 	<ul style="list-style-type: none"> ♦ children ♦ Formula 1 drivers ♦ Green Peace ♦ gymnasts ♦ lights ♦ mathematicians ♦ pedestrians ♦ pilots ♦ teachers ♦ traffic department ♦ women ♦ small^ ♦ round^ ♦ black ♦ plastic ♦ lamp shades ♦ cul-de-sac ♦ Kayalami ♦ containers ♦ Reggie's ♦ Toys 'R Us ♦ Welkom ♦ shops ♦ PC symbol ♦ Go! ♦ breathing athletes ♦ cheering ♦ oh no ♦ rotate* ♦ siren ♦ vroom ♦ I'm lost ♦ adrenalin rush ♦ entertainment ♦ leisure ♦ u-turn ♦ open-minded 	<ul style="list-style-type: none"> ♦ bolts ♦ cement ♦ figure 8 race track ♦ tar ♦ tartan ♦ wings ♦ ball ♦ birds ♦ butterflies ♦ cylinder ♦ fighterplanes ♦ fire trucks ♦ flies ♦ gramophone ♦ hang gliders ♦ mosquitos ♦ parachutes ♦ pogo stick ♦ recipe ♦ rings ♦ river ♦ sun ♦ t-junction ♦ traffic lights ♦ water ♦ brass ♦ BMX bikes ♦ Gold ♦ Silver ♦ mountain bikes ♦ stickers ♦ steel ♦ calculators ♦ earrings ♦ helmet ♦ ropes ♦ eternal 	<ul style="list-style-type: none"> ♦ repetition ♦ repeat* ♦ turn* ♦ return* ♦ oval ♦ track 	<ul style="list-style-type: none"> ♦ usual^ ♦ common^ ♦ again ♦ mayonnaise ♦ egg ♦ wrist ♦ knickers (UK)/panties (US) ♦ crazy ♦ helicopter ♦ tornado ♦ bend* ♦ spoon ♦ pillowcase ♦ answering machine ♦ video (UK)/VCR(US) ♦ fair ♦ warm ♦ change* ♦ yo-yo ♦ answer* ♦ upside-down

* word is found in all the different verb-forms, including “verb”, “verb + s”, “verb + ed”, “verb + en”, “verb + ing”, “to + verb”

^ word is found in all the different adjective forms, including “adjective”, “adjective + er”, “adjective + est”

4.5 SUMMARY

This chapter described the results of the study, with focus on the percentages of the different associations made with each icon. A list of associations that were elicited was presented for each icon and results of a comparison between the elicited word list and the current Unity™ association list were discussed.