

MEMORY BLOCKING AND RECOVERY
FOR AFFECT WORD LISTS

A Senior Honors Thesis

by

SARAH CATHERINE MOYNAN

Submitted to the Office of Honors Programs
& Academic Scholarships
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April 2004

Major: Psychology

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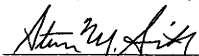
by

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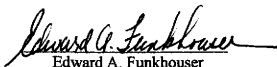
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ABSTRACT

MEMORY BLOCKING AND RECOVERY FOR AFFECT WORD LISTS

(April 2004)

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Smith et al. (2003) found powerful memory blocking and recovery effects for recall of categorized word lists. The present study investigated whether affective, or emotional, words could be similarly blocked and recovered, or whether their distinctiveness would prevent such words from being forgotten. Three experiments found a blocking and recovery effect for affect word lists similar to that found in previous experiments that used affectively neutral lists. The results of the present study suggest that interference and cuing can cause strong blocking and recovery effects with affective materials.

DEDICATION

To KJF and Samwise Gamgee

ACKNOWLEDGMENTS

I would like to thank Steve Smith for his enthusiasm and guidance as my mentor. I am lucky to have been able to work with such an amazing researcher and caring person. Hyun Choi and Dave Gerkens also deserve recognition for their help with statistics and experiment design. I could not have completed this project without their support and the understanding of my friends and family. Finally, I would like to thank my roommate, Lisa Moorman, for pretending not to mind my all-night bouts of typing throughout the year.

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INTRODUCTION¹

In 2003, Smith et al. created the “output interference blocking paradigm” in which they both blocked and recovered memories for categorized word lists (shown in Figure 1). After a presentation of all categories, participants spent additional time working with some of the words lists. This induced forgetting of the non-practiced or critical items. The interference blocking effect has been shown in many studies (Anderson, Bjork, and Bjork, 1994; Gleaves, Smith, Butler and Spiegel, in press; Nickerson, 1984; Roediger III, 1978). Anderson, Bjork and Bjork state that additional processing results in making practiced material more readily available in memory while simultaneously restricting access to and likelihood of recall of the non-practiced material. Wright, Loftus and Hall also found partial re-exposure to experimental material to cause an interference effect (2001).

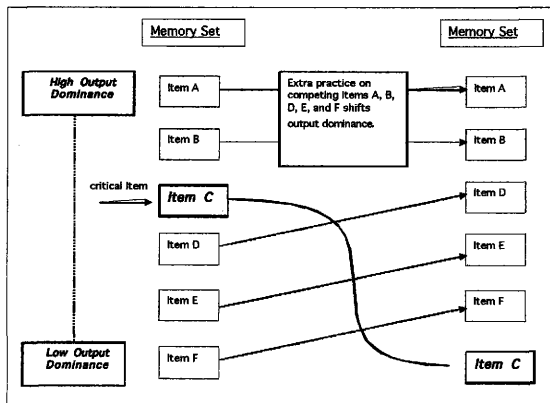
The 1994 book, *Unchained Memories: True stories of Traumatic Memories, Lost and Found*, claimed that “in order for a repressed (or blocked) memory to return, there is often a cue” (Terr, p. 12-14). Nickerson stated that “the provision of category names at recall time facilitates access to information that was in memory but inaccessible without cues” (1984). Thus the use of category name cues helped to counteract the shift in output dominance caused by the interference procedure.

In the Smith et al. 2003 study, participants were asked in a test session to recall all the words presented without hints or prompts (uncued recall) and then tested with

¹ This thesis follows the style and format of *Applied Cognitive Psychology*.

prompts (cued recall) that included category names for the critical, unpracticed word lists. By examining the difference in number of critical items recalled between the two memory tests, the researchers could discern the effect of word blocking and recovery (demonstrated by the words absence in uncued recall and later recovery as a result of the prompts in cued recall).

Figure 1. Output Interference Blocking Paradigm (from Smith et al. 2003)



Several researchers have claimed that emotion, or affect, plays a significant role in memory (Christianson Ed., 1992; Kuiken Ed., 1991; Loftus, Joslyn and Polage, 1998). Brown and Kulik demonstrated in 1977, that memory for emotional events was better than that for ordinary events, a claim replicated in 2000 by Dewhurst and Parry. Contrastingly, Kitayama showed a decrease in memory for emotional content when compared to neutral material (1991). Memory blocking and recovery studies incorporating affective material may be relevant to further understanding and improving the clinical treatment of trauma repression and subsequent recovery (Barnier & McConkey, 1992; Freyd & Gleaves, 1996; Gerkens, 2004).

Objectives

We sought to study whether participants could block and subsequently recover affective or emotional words. We proposed to do so by modifying the experimental design of Smith et al. (2003) to include affect words as critical word lists. In line with the belief that emotion influences memory production and recall (Dewhurst and Parry, 2000; Christianson Ed., 1992; Kuiken Ed., 1991; Loftus, Joslyn and Polage, 1998), we hypothesized that a statistical difference would be found when comparing the blocking and recovery of the affect word lists and neutral word lists.

EXPERIMENT 1

Method

In Experiment 1, we sought to replicate the output interference paradigm used in *Eliciting and Comparing False and Recovered Memories and Are Recovered Memories Accurate?* while including affective categories as critical items (Smith et al 2003; Gerken, 2004). We hypothesized that emotional distinctiveness would have an effect on the blocking and recovery of the critical items.

Participants

The participants in Experiment 1 were 57 Texas A&M University introductory psychology students who participated for partial fulfillment of course requirements. Students could elect to participate in other experiments or write a short paper in lieu of participating in this experiment. Participants were tested in groups of 15-20 per session. Each session lasted approximately two hours.

Materials

Twenty-four categorized word lists were taken from the lists used in Gerken's 2004 study (see Appendix A for word lists). The affect or emotional word lists were created by surveying university students and compiling three perceived positive lists and three perceived negative lists. Thirty-two introductory psychology students then ranked the six perceived affect categorized lists and 24 previously used perceived neutral word lists on quality of emotionality on a scale from negative three to positive three. The strength and valence of the each word and overall category emotionality were computed. The strongest positive affect list, strongest negative list and most

neutral list were selected to be the critical items. The 21 of the remaining 27 categorized lists that were rated closest to neutral were selected to be non-critical items.

Design and Procedure

The experiment used a 2 X 3 mixed design. Interference, a between-subjects variable, was either interference or control, conditions to which participants were randomly assigned. List affect, a within-subjects variable, was positive, negative, or neutral. A general outline of the procedure can be found in Figure 2.

Figure 2. General Experiment Procedure

Interference Condition		Control Condition
Step 1-- <i>initial list presentation:</i>	formation of memory for categorized lists	Step 1-- <i>initial list presentation:</i>
24 lists including 3 critical lists		24 lists including 3 critical lists
Step 2-- <i>intervening tasks:</i>	←blocking procedure in interference condition	Step 2-- <i>intervening, non-interfering control tasks:</i>
pleasantness rating		arithmetic problems
size/prestige rating		letter string hunt
syllable counting		mirror image drawing
memorability rating (in Experiment 3)		mazes (in Experiment 3)
Step 3-- <i>free recall test</i>	blocking observed	Step 3-- <i>free recall test</i>
Step 4-- <i>cued recall test</i>	recovery observed	Step 4-- <i>cued recall test</i>

In step one, participants first engaged in a study session during which twenty-four word lists were presented on a computer monitor through a PowerPoint

Presentation. The words were presented in categories, one word at a time. Each word remained on the screen for three seconds and the participants had three additional seconds to write the word on a response form and rank it for typicality per the category.

Step two of the procedure consisted of intervening tasks. After the initial presentation of the lists the control group completed various cognitive tasks such as arithmetic problems and mazes for 24 minutes. The experimental group had further exposure to the 21 non-critical neutral word lists through deep levels of processing tasks such as rating word pleasantness, ranking item size and counting syllables in the words, for an equivalent amount of time to induce memory blocking of the critical lists.

Following the 24-minute intervening task, participants in both conditions were given two recall tests (steps three and four of the procedure). The first test was a five-minute free recall test; subjects were instructed to write down any of the category names they could recall from the initial presentation and to write category members if they had forgotten the group name. The second test was a cued recall test. The category names of the critical word lists were presented on a computer monitor through a PowerPoint presentation. Participants were given 90 seconds for each category to write down as many items as they could recall.

The difference between the proportion of category names recalled by participants in the two conditions was measured in order to calculate the interference blocking effect. As in Smith et al., we defined blocked memories as “memories which are rendered inaccessible for some period of time, after which the essentially intact memories are

retrieved" (2003). Recovery of the blocked categories was calculated by examining the number of items in each critical list recalled by the participants.

Results

A significance level $p < .05$ was used in all experiments unless otherwise noted.

Free Recall and Blocking

Categories were counted as recalled if the category name was written on the response sheet. There were no cases of participants recalling category members without also listing category names.

A 2 X 3 (interference X list affect) Analysis of Variances (ANOVA) was computed using the proportion of category names recalled on the free recall test. Interference, a between subjects variable was either interference or control. List affect was manipulated within subjects and was positive, negative or neutral.

The results of the ANOVA test were inconclusive due to the fact that none of the interference condition participants recalled words from either affective category (See Table 1). Least significant differences tests were used instead [positive: $t(55)=1.50$, $p=0.14$; negative: $t(55)= 2.24$, $p=0.03$; neutral: $t(55)=0.16$, $p=0.88$]. Blocking for the affect word categories was seen in both conditions but to a greater extent in the interference condition.

Table 1. Experiment 1 Free Recall; proportion of category names recalled

List Affect	Interference Variable	
	Interference Condition	Control Condition
Positive	0.00 (0.00)	0.27 (0.45)
Negative	0.00 (0.00)	0.03 (0.18)
Neutral	0.41 (0.50)	0.60 (0.50)

Note: Standard deviations appear in parentheses.

Cued Recall and Recovery

Categories were scored as recovered if the participant was able to list one or more of the category members after not recalling the category name in the free recall test. See Table 2 for average participant recall.

A 2 X 3 (interference X list affect) Analysis of Variances (ANOVA) was computed using the number of category members recalled on the cued recall test. There was a marginally significant effect of interference [$F(1, 55)=0.28$, $MSE=0.55$]; more critical list names were recalled by the control condition than the interference group (See Table 2). The interference group recalled significantly fewer affect word list members than members from the critical neutral list. There was no significant difference within either condition for the recall of the positive and negative lists.

Table 2. Experiment 1 Cued Recall; average number of category members recalled

List Affect	Interference Variable	
	Interference Condition	Control Condition
Positive	5.70 (0.40)	6.53 (0.38)
Negative	5.96 (0.26)	6.77 (0.25)
Neutral	6.26 (0.34)	6.33 (0.33)

Note: Standard errors appear in parentheses.

Discussion

The findings of Experiment 1 show that affective words can be blocked and recovered using the same procedure as for neutral word lists. The results demonstrate that emotional distinctiveness does not protect against interference, but rather may heighten the blocking effect. It was also shown that the valence of the affect categories (positive or negative) does not influence interference or recovery of the category names or items.

EXPERIMENT 2

Method

Experiment 2 expanded upon the findings of Experiment 1. In the pilot study for the set of experiments, the negative categories were rated stronger on absolute emotionality than all of the positive word lists. Due to no differences being found between the blocking and recovery of the positive and negative critical items in Experiment 1, a decision was made to substitute an additional negative emotion list for the positive emotion list. The within-subjects list affect variable was relabeled accordingly as negative (strong), negative and neutral. The intervening task was lengthened by eight minutes for both conditions in order to increase interference.

Participants

Forty-five Texas A&M University introductory psychology students participated for partial fulfillment of course requirements. Students could elect to participate in other experiments or write a short paper in lieu of participating in this experiment. Participants were tested in groups of 15-20 per session. Each session lasted approximately two hours.

Materials

The lists used in Experiment 2 were the same as in the previous experiment. An additional intervening task was added for both the control and interference conditions.

Design and Procedure

The design of Experiment 2 was similar to Experiment 1 with small changes. An additional negative emotion list was substituted for the weaker positive category. The length of the intervening task was increased to 32 minutes with the addition of a pleasantness rating task to the interference condition and a character string hunt to the control condition.

Results

Note: The findings of Experiment 2 replicated those of a pilot study. Experiment 2 was changed from the pilot study to correct small procedural flaws (i.e. list title change).

Free Recall and Blocking

A 2 X 3 (interference X list affect) Analysis of Variances (ANOVA) was computed using the proportion of category names recalled on the free recall test. Interference, a between subjects variable was either interference or control. List affect was manipulated within subjects and was negative (strong), negative or neutral. There was a significant effect of interference [$F(2, 86)=14.20$, $MSE=0.15$]; more critical lists were recalled by the control group than by the interference group (See Table 3). There was also an effect for list type [$F(1, 43)= 11.73$, $MSE=0.24$]; the negative (strong) list showed a bigger blocking effect than the neutral and negative categories.

Table 3. Experiment 2 Free Recall; proportion of category names recalled

List Affect	Interference Variable	
	Interference Condition	Control Condition
Negative (Strong)	0.04 (0.04)	0.21 (0.96)
Negative	0.38 (0.10)	0.74 (0.10)
Neutral	0.23 (0.08)	0.58 (0.12)

Note: Standard errors appear in parentheses.

Cued Recall and Recovery

A 2 X 3 (interference X list affect) Analysis of Variances (ANOVA) was computed using the number of category members recalled on the cued recall test.

There was not a significant effect of interference [$F(2, 86)=112.14$, $MSE=1.00$]; category member recall was identical for the control and interference conditions as seen in Table 4. There was a marginal effect for list type [$F(1, 43)=2311.05$, $MSE=2.85$]; the negative list produced the most words recalled per category overall.

Table 4. Experiment 2 Cued Recall; average number of category members recalled

List Affect	Interference Variable	
	Interference Condition	Control Condition
Negative (Strong)	6.70 (0.25)	6.21 (0.24)
Negative	8.73 (0.25)	8.68 (0.20)
Neutral	6.46 (0.40)	5.63 (0.28)

Note: Standard errors appear in parentheses.

Discussion

A significant blocking effect was found in the free recall test for the neutral and negative lists with a slightly smaller effect found for the negative strong list. Unlike in the first experiment, there was not a large blocking dissimilarity between the affect and neutral critical items. This refutes the hypothesis that emotional distinctiveness plays an enhancing role in interference blocking.

Despite interference variable differences in the free recall task, the control and interference conditions performed identically in the cued recall test, demonstrating the effectiveness of the interference blocking. The negative list was both blocked to a smaller degree and recovered to a larger degree than the other critical items. We hypothesized that this difference came from other distinctive characteristics of the category than emotionality (i.e. frequency of use, context of use).

EXPERIMENT 3

Method

In Experiment 3 we sought to extend the scope of Experiment 2 by including affective categories in the non-critical items. We wanted to investigate whether the inclusion of additional affective material would heighten the awareness of the critical emotion categories and thus decrease blocking, or alternatively increase blocking by making the critical items less distinctive.

Participants

Forty-seven Texas A&M University introductory psychology students participated for partial fulfillment of course requirements. Students could elect to participate in other experiments or write a short paper in lieu of participating in this experiment. Participants were tested in groups of 15-20 per session. Each session lasted approximately two hours.

Materials

The materials used in Experiment 3 were taken in part from those used in the previous experiments. Eight of the neutral word lists were replaced with affect word lists. The additional affect word lists came from the pilot study performed as preparation for Experiment 1 (see Appendix A for word lists). The critical negative (strong) list was replaced by a category similar in affect strength but that differed in frequency of use. This substitution was made to test the prediction that frequency of use may influence the blocking of negative categories.

Design and Procedure

Experiment 3 followed the same 2 X 3 mixed design and procedure as Experiment 2.

Results*Free Recall and Blocking*

A 2 X 3 (interference X list affect) Analysis of Variances (ANOVA) was computed using the proportion of category names recalled on the free recall test. Interference, a between subjects variable was either interference or control. List affect was manipulated within subjects and was negative (strong), negative or neutral.

As can be seen in Table 5, there was a significant effect of interference [$F(2, 90)=17.96$, $MSE=0.16$]; more critical lists were recalled by the control group than by the interference group (See Table 3). There was also an effect for list type [$F(1, 45)=197.45$, $MSE=0.16$]; once again the negative (strong) list showed a bigger blocking effect than the neutral and negative categories.

Table 5. Experiment 3 Free Recall; proportion of category names recalled

List Affect	Interference Variable	
	Interference Condition	Control Condition
Negative (Strong)	0.09 (0.62)	0.72 (0.10)
Negative	0.55 (0.11)	0.96 (0.04)
Neutral	0.14 (0.07)	0.40 (0.10)

Note: Standard errors appear in parentheses.

Cued Recall and Recovery

A 2 X 3 (interference X list affect) Analysis of Variances (ANOVA) was computed using the number of category members recalled on the cued recall test.

There was not a significant effect of interference [$F(2, 90)=54.58, MSE=1.39$]; category member recall was identical for the control and interference conditions. As in Experiment 2, critical item recovery by the control and interference conditions was identical despite the large dissimilarities in blocking (shown in Table 6). There was a marginal effect for list type [$F(1, 43)=1411.95, MSE=4.12$].

Table 6. Experiment 3 Cued Recall; average number of category members recalled

List Affect	Interference Variable	
	Interference Condition	Control Condition
Negative (Strong)	5.59 (0.26)	5.68 (0.29)
Negative	8.73 (0.25)	8.68 (0.20)
Neutral	6.46 (0.39)	5.63 (0.28)

Note: Standard errors appear in parentheses.

Discussion

The results of the cued recall test mirrored those of Experiment 2, suggesting that the presence of additional affective categories and words does not hinder or enhance cued recovery. Furthermore, recall of the negative (strong) category items in this

experiment was identical to that of the prior experiment, suggesting that frequency of word use may not play a significant role in cued recovery.

CONCLUSION

The hypothesis that blocking for affect word categories would differ that of from neutral word categories due to emotional distinctiveness was not supported by Experiments 2 and 3. The interference blocking effect was seen for both neutral and affect categories. Furthermore, category valence (positive or negative affect) did not appear to play a role in blocking. Memory recovery was found to be the same for affective and neutral words. The results of these experiments show that memories for affect words can be formed, interfered with or blocked and then subsequently recovered with a cue using the same process as used for neutral word categories. These results may be important for abuse victims and PTSD (post-traumatic stress syndrome) patients in validating their recovered memories and formulating treatment.

Future memory blocking and recovery research using word lists should examine other characteristics of words, such as length, distinctiveness and frequency of use as potential moderating variables (Dewhurst and Parry, 2000). Additionally, continued experiments in blocked and recovered memories could use even stronger affect material such as trauma words, vignettes or pictures in order to enhance the applicability of research to real world settings. Finally, researchers should test the output interference paradigm using affective stimuli on special populations (i.e. abuse victims, people who score high on dissociative ability) to see if their responses differ from that of introductory psychology students.

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APPENDIX A

Experiment Stimuli*** Critical Item**

Desserts	Birds	Kitchen Objects	Clothing
Brownie	Eagle	Steak knife	Socks
Cake	Crow	Fork	Shoes
Fudge	Parrot	Pot	Bra
Pie	Chicken	Can opener	Skirt
Jello	Ostrich	Bowl	Jacket
Ice cream	Pigeon	Cup	Sweatshirt
Pudding	Canary	Beater	Hat
Crème brulee	Robin	Frying pan	Tie
Tart	Dove	Skillet	Hose
Sorbet	Bluebird	Ladle	slacks
Countries	Reading Material	*Death	Living Quarters
France	Magazine	Croak	House
Russia	Newspaper	Rot	Tent
Germany	Novel	Vulture	Hut
Italy	Paper	Coffin	Trailer

Mexico	Short story	Morgue	Motel
Japan	Article	Corpse	Mansion
Brazil	Play	Cemetery	Dorm
Ireland	Essay	Funeral	Cabin
Norway	Poem	Road-kill	Duplex
Argentina	Fiction	Murder	Houseboat
Fish	*Tools	Vehicles	Weapons
Goldfish	Hammer	Truck	Knife
Shark	Wrench	Bus	Rifle
Flounder	Nail	Jeep	Bomb
Trout	Drill	Van	Mace
Swordfish	Bolt	Go cart	Grenade
Angelfish	Jack	Moped	Dagger
Marlin	Crowbar	Sports car	Rope
Minnow	Nut	Bike	Ice pick
Blowfish	Vise	Plane	Whip
Herring	Chisel	Tractor	Bayonet
*Holidays	Trees	Fruit	Insects
Tradition	Oak	Apple	Fly

Music	Pine	Banana	Bee
Feast	Palm	Kiwi	Spider
Festival	Cherry	Strawberry	Roach
Celebration	Spruce	Cantaloupe	Grasshopper
Vacation	Ash	Lemon	Gnat
Party	Walnut	Plum	Flea
Food	Hickory	Pineapple	Tick
Gifts	Sycamore	Lime	Termite
Stories	Cypress	Mango	Cricket
Metals	Cities	Gross	States
Iron	New York	Guts	New York
Steel	Los Angeles	Blood	Maryland
Platinum	Dallas	Pus	Illinois
Aluminum	London	Vomit	Virginia
Tin	Miami	Fart	Maine
Brass	Philadelphia	Booger	Ohio
Bronze	St. Louis	Gangrene	Wisconsin
Sodium	Rome	Maggots	Washington
Potassium	Cleveland	Warts	Georgia
Uranium	Atlanta	Mucus	Oregon

Sports	Instruments	Toiletries	*Diseases
Basketball	Clarinet	Shampoo	AIDs
Baseball	Trumpet	Toothbrush	Parkinson's
Swimming	Tuba	Deodorant	Measles
Track	French horn	Tampons	Influenza
Volleyball	Trombone	Brush	Pneumonia
Polo	Piano	Comb	Polio
Rugby	Cello	Lotion	Herpes
Skiing	Piccolo	Razor	Asthma
Diving	Harmonica	Toilet paper	Chicken pox
Lacrosse	Keyboard	Mouthwash	leukemia
Sex	*Curse Words	Furniture	Officials
Penis	Shit	Chair	President
Intercourse	Hell	Bed	Senator
Orgasm	Damn	Coffee table	Treasurer
Masturbate	Crap	Love seat	Governor
Orgy	Bitch	Recliner	Secretary
Clitoris	Asshole	Bookshelf	ambassador
Vagina	Fuck	Armoire	Chairman
Breast	Piss	Stool	Alderman

Fellatio	Jackass	Futon	Sheriff
Semen	Bugger	Ottoman	Mayor
Flowers	Vegetables		
Rose	Carrots		
Carnation	Lettuce		
Violet	Squash		
Zinnia	Peas		
Pansy	Potato		
Gardenia	Corn		
Dandelion	Cauliflower		
Lilac	Zucchini		
Sunflower	Asparagus		
Gladiola	Green beans		

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 Research Assistant, Texas A&M University, Department of Psychology, 2003-2003. Duties: data collection and video coding for Dr. Jeff Simpson.

Poster and Oral Presentations:

Moynan, S.C., & Smith, S. M. (2004, March). *Can emotional words be blocked and recovered?* Oral presentation at Student Research Week, placed first in undergraduate division, College Station, TX.
 Fingeret, M. C., Warren, C., Moynan, S.C. & D. H. Gleaves. (2003, November). *Eating disorder prevention research: A meta-analysis.* Poster presented at the AABT Convention, Boston, CT.
 Moynan, S.C., & Smith, S. M. (2003, November). *Potential memory blocking for emotional words.* Poster presented at the Pathways Student Research Symposium, Galveston, TX.
 Moynan, S.C., & Smith, S. M. (2003, October). *Memory blocking and recovery for affect word lists.* Poster presented at the ARMADILLO: Southwest Cognition Conference, College Station, TX.

Honors and Awards:

President's Endowed Scholarship and Director's Excellence Award, 2000-2004
 Honors Program Participant, Texas A&M University, 2000-2004. Distinctions earned:
 Undergraduate Research Fellows, University Honors, Psychology Honors
 Phi Beta Kappa, Inducted 2004
 Champe Fitzhugh Jr. International Honors Leadership Seminar, 2000

Internship Experience and Research Abroad:

Burdekin Dry Tropics Board, Intern, Townsville Queensland Australia, Summer 2003.