PRIMARY EMOTIONS AND SOCIAL RELATIONS: A FIRST REPORT

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ABSTRACT

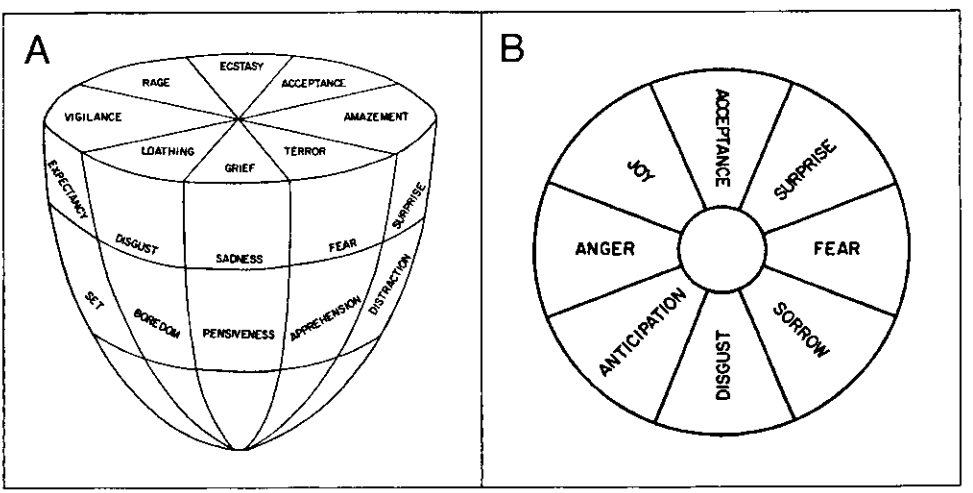
Affect-spectrum theory provides a model for predicting eight primary emotions, 28 secondary emotions (pairs of primaries) and up to 56 tertiary emotions (triples of primaries). Using a content-analytic methodology and a corpus of life-historical interviews of Euro-Australians and Australian-Aborigines for a cross-cultural comparison, it was found that eight basic emotions could be effectively predicted from the positive and negative experiences of four kinds of social relations. Fifteen of 16 predictions were satisfied, and the relation between surprise and the negative experience of territoriality/market-based relations was predictive only after measuring this socio-relational variable differently in the two cultures.

INTRODUCTION

This research report describes, and studies empirically, a conceptual model linking eight primary emotions to eight social relations variables. Ever since Darwin (1872), evolution-oriented theorists of emotions have viewed emotions as adaptive reactions to problems posed by the environment employed by members of various species to increase their inclusive fitness and chance of survival and reproduction. Several theorists have proposed the existence of some small set of emotions that are basic, primary, fundamental, or elementary. An emotion can be considered primary if: i) it can be found in a wide range of human cultures, suggesting it is universal for humans; ii) it also exists in other animal species; iii) it has a distinctive neuromuscular-expressive pattern manifested in facial expression, posture, or gesture; iv) it has a specific, innately determined biological basis in brain organization (see Panskepp 1998; Rolls 2001); v) it develops very early in life; and vi) it is not interpretable as a combination of two or more other emotions.

Plutchik's (1962) model of primary emotions comes with a compelling rationale. He proposes that there are exactly four fundamental problems of life, shared by all species of animals — identity, temporality (reproduction), hierarchy, and territoriality. These eight primary emotions are seen as the prototypical adaptive reactions to positive and negative experiences of four existential situations. Plutchik argued that acceptance and

Figure 1.



Panel **A**. Plutchik's 'top', representing varying levels of intensity for the eight primary emotions. Panel **B**. Plutchik's 'wheel', a circumplex for emotions based on a cross-section of the multidimensional model of Plutchik 1962 wheel. (Plutchik 1962 111)

Table 1: Basic Concepts of Plutchik's Model of the Primary Emotions

Problem of Life Valence	Primary Emotion (most generic subjective term(s))	Behavioral Process
Hierarchy		
positive	destruction (anger)	moving toward
negative	protection (fear)	moving away from
Territory		
positive	exploration, interest* (anticipation)	opening a boundary
negative	orientation (surprise)	closing a boundary
Identity		
positive	incorporation (acceptance)	taking in
negative	rejection (disgust)	expelling
Temporality		
positive	reproduction (joy, happiness)	gaining
negative	reintegretion (sadness, grief, loneliness)	losing

*The inclusion of interest, which is seen as synonymous with exploration, is a contribution not of Plutchik but of Tomkins (1962 Chapter 10), who sees interest-excitement as a first positive emotion expressed by a newborn human baby.

disgust are the adaptive reactions to the positive and negative experiences of identity; happiness and sadness, to temporality; anger and fear, to hierarchy; and anticipation and surprise, to territoriality.

The primary emotions thus come in pairs of opposites, and also vary in their degree of similarity to each other: this postulate is embodied in Plutchik's 1962 "wheel," in which the four dimensions, corresponding to the four problems of life, are shown as lines with a common midpoint, arranged as a circle, technically a circumplex, as shown in Figure 1.

Plutchik's model is summarized in Table 1. The leftmost column lists the four problems of life. The second column shows the functions of the eight emotions, and, in parentheses, the most common subjective terms for these emotions. For the existential problem of hierarchy, for example, the functions are destruction and protection, known by the terms anger and fear. The third column shows that the behavior of anger is 'moving toward' while fear is 'moving away from'. The valences of anger and fear are positive and negative, respectively.

EMOTIONS AND SOCIAL RELATIONS

There is no question that social relations are prime instigators of emotions (Kemper 1978; de Rivera & Grinkis 1986). Emotions are responsive to environmental events and for the human the environment is above all else social. The object of emotions is most apt to be other persons, small groups of persons, and categories of persons. When asked to describe situations in which they experience certain emotions, people almost invariably report contexts involving social relations. Yet, while there is a consensus on the importance of social relations to the experience of specific emotions, there is little agreement on how social relations can best be conceptualized. In this report, social relations are described — as they have been by numerous classical and contemporary social scientists — in a way that serves as a corrective to the sociological emptiness of Plutchik's model. The model used here is consistent with Durkheim (1893/1960), Scheler (1926), and Fiske (1991), and uses Fiske's terminology (see also TenHouten 2004a, 2005).

Identity in Plutchik's sense can be generalized into what Fiske calls the social relationship of equality matching (EM), which exists on the level of turn taking in temporal sequences consistent with latent social norms; as in-kind reciprocity, in which each person gives and gets back what they view as substantially the 'same' thing; and as distributive justice in which an even distribution of valuable objects and things so that each person receives roughly an equal share: to each the same, regardless of needs or usefulness.

The positive pole of temporality, reproduction, contains a key idea of communal sharing (CS). This is a relationship based on duties and sentiments generating kindness and generosity among people in informal communities. The basis of CS is sexual reproduction, birth, and begetting, institutionalized as the family and kinship system. In CS, people have a sense of solidarity, unity, belonging, and social cohesion, and act in the interests of community rather than the

self.

Hierarchy is a fundamental problem of social life. There is virtually no conceptual distance between Plutchik's hierarchy and Fiske's authority ranking (AR), which is an asymmetrical relationship of inequality.

Territoriality is an organizing concept in ethology describing natural behavior oriented to the control of, possession of, use of, and defense of a claimed space deemed necessary for survival. It is the basis of behavior directed to boundary creation (anticipation) and boundary defense (surprise). The complex and multi-level spaces and places that we occupy are closely linked to social relations pertaining to with resources and valued objects and situations. The notion of human territoriality must, for purposes at hand, be further broadened to include: all forms of market pricing (MP) relations, including possessions, physical and symbolic capital and crystallized energy in the form of money. In MP relationships people denominate value by a universal metric of money and also of linear, clock- and calendar-based time (TenHouten 2005).

THE STUDY

The propositions of the study are: i) acceptance and disgust are the adaptive reactions to the positive and negative experience of equality-matched social relations, respectively; ii) joy and sadness, to communal sharing relations; iii) anger and fear, to authority-ranked relations; and iv), anticipation and surprise, to market-based social relations.

These eight propositions will be tested empirically using as a dataset complete transcripts of a corpus of 658 life-historical interviews obtained and processed over the last decade. These interviews were obtained during the author's fieldwork in Australia and represent two radically different cultures, the indigenous Australian Aborigines and Euro-Australians.

Method

The method used for the present analysis is a lexical-level content analysis of text comprising the words produced by the informant in a life-historical interview. To this end, Roget's (1977) *International Thesaurus* was used, which provides a hierarchical classification of the English language. Roget developed an inventory of 1,042 "broad classes of words" (folk-concepts), many of which were selected as manifest indicators of the eight variables measuring the positive and negative experiences of equality matching (EM+, EM–), communal sharing (CS+, CS–), authority ranking (AR+, AR–), and market pricing (MP+, MP–). In making a word list from the folk concepts, subcategories with meanings tangential to the overall concept were deleted at the outset, and then all possible forms of every word under the key word were considered for inclusion. The primary denotation of every word was used as the criterion for classification and for deciding where to place words that were assigned to two or more folk concepts by Roget.

Data

The dataset for this study consists of edited transcripts from a corpus of 658 life-historical interviews, with 383 Aborigines (204 males and 179 females) and 275 Euro-Australians (155 males and 120 females). These interviews were obtained throughout Australia and are roughly representative of the two subpopulations. Australia is a multicultural society by any measure, but the non-Aboriginal, Euro-Australian interviews were restricted to Australian citizens who trace their ancestry primarily to the British Isles and Northern Europe, in an effort to reduce within-sample variation. The Aboriginal interviews ranged from traditional, tribal-living persons to urbanites highly assimilated to modern Australia and its market economy. Many of the interviews were obtained by the author, in collaboration with Aborigines from the New South Wales Aboriginal Family Education Centres Federation, while others were obtained from institutes, libraries, private collections, and publications.

Measurement and Analysis

To be confident that the words indicating folk concepts are not measuring different concepts, for each candidate folk concept an item analysis based on the method of summated ratings (Edwards 1957 149-57) was carried out for all of the selected words assigned to every Roget folk concept; t-tests of the mean difference between upper and lower fourths of scores for all words were calculated for each word, and words were next selected only if their t-ratios have values of +1.0 or greater.

The variable Culture was coded Aborigines 1 and Euro-Australians 0; Sex, males 1

Table 2: Indicators of the Eight Social Relations Variables and the Five Most Used Words for Each, Showing the Relative Frequencies of Each Word. For Each Social Relational Variable , Tucker-Lewis(TL) Reliabilities are Shown, and for Each Indicator, Factor Pattern Scores (FP) are Shown.

Social Relations	Indicators	FP	Five Most Frequently Used Words
Equality Matching	Identity	0.30	agreement 277, identity 213, identify 131, indistinct 59, fuse 40
Positive TL = 0.63	Affirmation	0.02	statement 123, announce 87, statements 71, stated 64, assured 61
	Accord	0.44	respect 676, respected 248, like-mindedness 40, accordance 27, symphony 27
	Justice	0.06	fairly 1175, fair 1059, sporting 246, justice 232, rightly 92
	Equality	0.61	even 636, level 552, equality 109, fifty-fifty 81, equivalent 61
Communal Sharing	Welcome*		visit 962, visited 371, visiting 368, hey 226, hail 94
Positive TL = 0.99	Friendship	0.99	fellow 1737, fellows 671, friendly 479, likes 171, fellowship 103
	Friends	0.93	friends 2205, friend 136, neighbors 79, intimate 43, colleagues 49
	Lovemaking	0.11	dear 647, philander 145, darling 141, breast 111, kiss 70
	Kindness	0.11	indulgent 2078, amiable 193, good-natured 184, generous 129, goodwill 126
Authority Ranking	Demand	0.29	asked 3038, ask 1945, asking 667, direction 389, claim 231
Positive TL = 0.87	Opposition	0.18	confronted 49, confrontation 30, confront 21, opponent 18, opposed 13
	Disobedience	0.36	rebelled 26, rebellious 23, mutiny 21, rebellion 16, recalcitrant 14
	Defiance	0.13	cheeky 141, dare 113, dared 38, bold 38, daring 24
	Disapproval	0.61	criticism 129, critical 90, rejected 53, reject 44, appalling 33
Market Pricing	Spaciousness	0.25	everywhere 716, field 620, extent 480, desert 339, acres 435
Positive TL = 0.92	Possessor	0.17	owner 920, landlord 413, owns 412, ownership 397, occupants 236
	Possession	0.29	owned 731, having 312, keeper 62, possession 46, occupy 36
	Acquisition	0.77	obtain 140, profit 138, acquired 122, gain 120, gained 111
	Wealth	0.12	afford 432, fortune 103, wealthy 74, wealth 63, luxury 41
	Receive	0.16	loan 97, inherited 81, lend 76, loans 50, banker 24
Equality Matching	Difference	0.13	different 5688, difference 873, otherwise 612, odd 398, differences 106
Negative TL = 0.92	Disrepute	0.09	fowl 65, begged 46, notorious 34, disgrace 33, begging 30
	Injustice	0.84	wrong 1898, unfair 55, wrongly 40, injustice 32, wronged 23
	Inequality	-0.03	disparity 41, overbalance 11, overbalancing 6, inequality 3, unequal 3
Communal Sharing	Selfish	0.41	petty 67, greedy 53, greed 30, selfish 27, loner 17
Negative TL = 0.58	Seclusive	0.42	retires 600, private 545, secret 251, retirement 105
	Death	0.20	died 3751, deadly 1345, death 821, dying 265, drowned 132
	Discourtesy	0.11	crude 87, coarse 24, rude 82, crusty 8, vulgar 8
	Dislike	0.30	dislike 46, dislikes 27, unpopular 14, repel 9, nausea 8

Table 2: Indicators of the Eight Social Relations Variables continued

Social Relations	Indicators	FP	Five Most Frequently Used Words
Authority Ranking	Lack of		
Negative TL = 0.93	Influence	0.22	weak 127, weakness 25, ineffective 6, ineffectual 6, powerless 3
	Confined	0.23	prison 1175, hell 624, prisoners 645, jail 329, prisons 209
	Obedience	0.28	obedient 155, loyally 55, loyalty 54, faithful 21, allegiance 11
	Prohibited	-0.02	prevent 96, ban 49, banned 49, refused 26, don't 20
	Condemnation	0.53	damn 108, damned 83, convicted 49, sentenced 32, conviction 26
	Inferiority	0.15	inferior 46, inadequate 26, inferiority 23, deficiency 11, deficiencies 11
Market Pricing	Expensiveness		expensive 146, invaluable 32, costly 26, richly 6, exorbitant 3
Negative	Loss	0.58	loss 198, losing 187, lost 179, expenses 108, expense 71
	Ejection		discharge 90, evict 67, dismiss 58, ejecting 39, ejection 39
	Relinquish	0.28	borrow 124, borrows 100, disposal 38, hocking 38, disposed 30
	Dislocation	0.45	shifted 405, shifting 96, shifts 58, shift 37, displace 23
	Circumscribed	0.20	fixed 322, qualified 225, edges 50, specify 24, definition 24

*In order to obtain a maximum-likelihood factor analysis solution (communalities not > 1.0), it was necessary to construct a variable that is the sum of scores for Welcome and Friendship, which does not influence the final summated ratings for CS+.

and females 0. Roget also categorized emotions, and his classification was helpful in constructing wordlists for emotions, which required some combining and splitting of categories and the supplementary use of several dictionaries. Table 2 shows the 16 most frequently used words for each of the eight primary emotions. A study of the univariate distributions of the eight emotions variables indicated that all of them were heavily skewed to the right. To approximately normalize these eight distributions, square-root transformations were carried out prior to regression analysis.

The several indicators for every social relations variable were subjected to maximum-likelihood factor analysis and Tucker-Lewis (TL) inter-indicator reliability coefficients were calculated, except for MP–, for which a solution could not be obtained. The results of these analyses are shown in table 3. For the eight measures of primary emotions, the final measure was the total number of words used from the list of folk-concept indicators, divided by the total words produced in the whole interview; this quotient was then multiplied by 104, to sweep away distracting zeros.

Results

Eight multiple-regression analyses were carried out, regressing each of the eight primary emotions on the same set of eight social relations variables and cofactors Sex and Culture. The results of the separate analyses for Aborigines and Euro-Australians are shown in Table 4, panes A and B, respectively. All of the non-significant (ns) cofactors were returned to residual status before the final analyses were carried out.

For all eight emotions and all eight socio-relational variables, the sum of the total number of usages of the words assigned to each variable was divided by the total number of words spoken by the informant, with this proportion then weighted by 104. For the independent variables, small sets of folk-concepts were used as indicators. For example, the proposed direct cause of acceptance, EM+, was measured by words representing five Roget folk-concepts.

The predicted results for the socio-relations variables as predictors of emotions are shown, in boldface type, along the main diagonals of the first eight rows of the two panels. The probability values associated with

Table 3: The Sixteen Most Frequently Used Words for Each of the Eight Primary Emotions, Where Relative Frequency is the Proportion of the Word to Total Words Produced by the Informant in the Entire Interview, Weighted by 10^6

Acceptance Incorporation		Happiness, Joy Reproduction		Anger Destruction		Anticipation Exploration	
invites	366	enjoyed	764	angry	284	question	745
popular	305	enjoy	432	annoyed	90	study	605
regard	216	glad	345	anger	85	expected	401
admits	176	joy	199	annoy	81	attend	368
favour	155	enjoying	70	temper	70	opinion	360
invited	97	celebratory	70	furious	68	attention	302
admitted	96	celebration	70	annoyed	38	inspection	220
ovation	84	celebrates	34	short-tempered	29	studied	203
invitation	78	hilarious	33	irritated	21	studying	195
admired	67	guffaw	26	nettled	21	examination	150
approval	62	vim	18	nettling	21	expecting	117
advocate	59	rejoicing	17	irritated	21	inquiry	105
clapping	46	gladly	14	irateness	17	attending	100
acknowledge	38	rejoice	13	wrath	15	observed	88
honourable	38	gusto	12	lividness	12	attendance	76
clapped	33	cheers	11	irascibly	12	guidance	74

Disgust Rejection		Sadness, Grief Reintegration		Fear Protection		Surprise Orientation	
criticism	129	sad	586	frightened	846	surprised	243
critical	90	crying	418	fear	543	surprise	201
dismissed	58	cry	363	afraid	489	surprising	65
rejected	53	joyless	150	scared	274	astounded	18
reject	44	sadness	74	fright	117	astonishment	18
disgusted	24	long-faced	65	frightening	88	unexpectedly	14
criticized	20	grim	55	terror	79	surprises	12
displeasing	20	sorrow	49	fearful	65	surprisingly	10
evacuation	18	howling	49	coward	56	dumfounded	8
excluded	14	wails	40	panic-stricken	47	unexpectedness	8
rejection	12	wailing	30	terrifying	45	improbably	8
detract	12	sadly	26	scare	41	unexpected	4
dismiss	11	wailed	24	eerie	27	aback	3
smearing	10	cried	24	scary	23	astonished	3
slur	9	mope-eyed	22	scaring	15	astounds	3
deplorable	8	unhappiness	220	eerily	11	stupefied	3

these coefficients are based on one-tailed tests, as all of these coefficients were predicted to be positive in sign. All coefficients off the main diagonals, for which predictions were not made, have two-tailed probabilities associated with them. Because these off-diagonal results were not predicted, and are available for inspection, they will not be discussed.

For the Aborigines, the ^{2} values were all positive and significant. For the Euro-Australians, the results were in the predicted direction for all eight emotions, and statistically significant for seven, but the result for Surprise only directionally supported the theory ($^2 = 0.55$).

It is not surprising that Surprise would not be effectively predicted by the negative experience of MP, for there were measurement problems with both variables: i) MP– was measured poorly relative to the other socio-relational independent variables, as a reliability estimate for these six indicators could not be obtained; ii) Surprise was measured by words used more rarely than the words representing the other seven emotions, as can be seen in table 2; iii) the sample sizes are not large, only 275 for the Euro-Australians; and iv) a follow-up analysis of the six folk-concept indicators of MP– revealed that the approximate interchangeability of indicators that held, albeit roughly, for the other seven socio-relational variables did not hold for Surprise. It was found that these six indicators of MP– were of two kinds, and their effects radically differed for members of the two cultures.

For the Aborigines, Surprise was predict

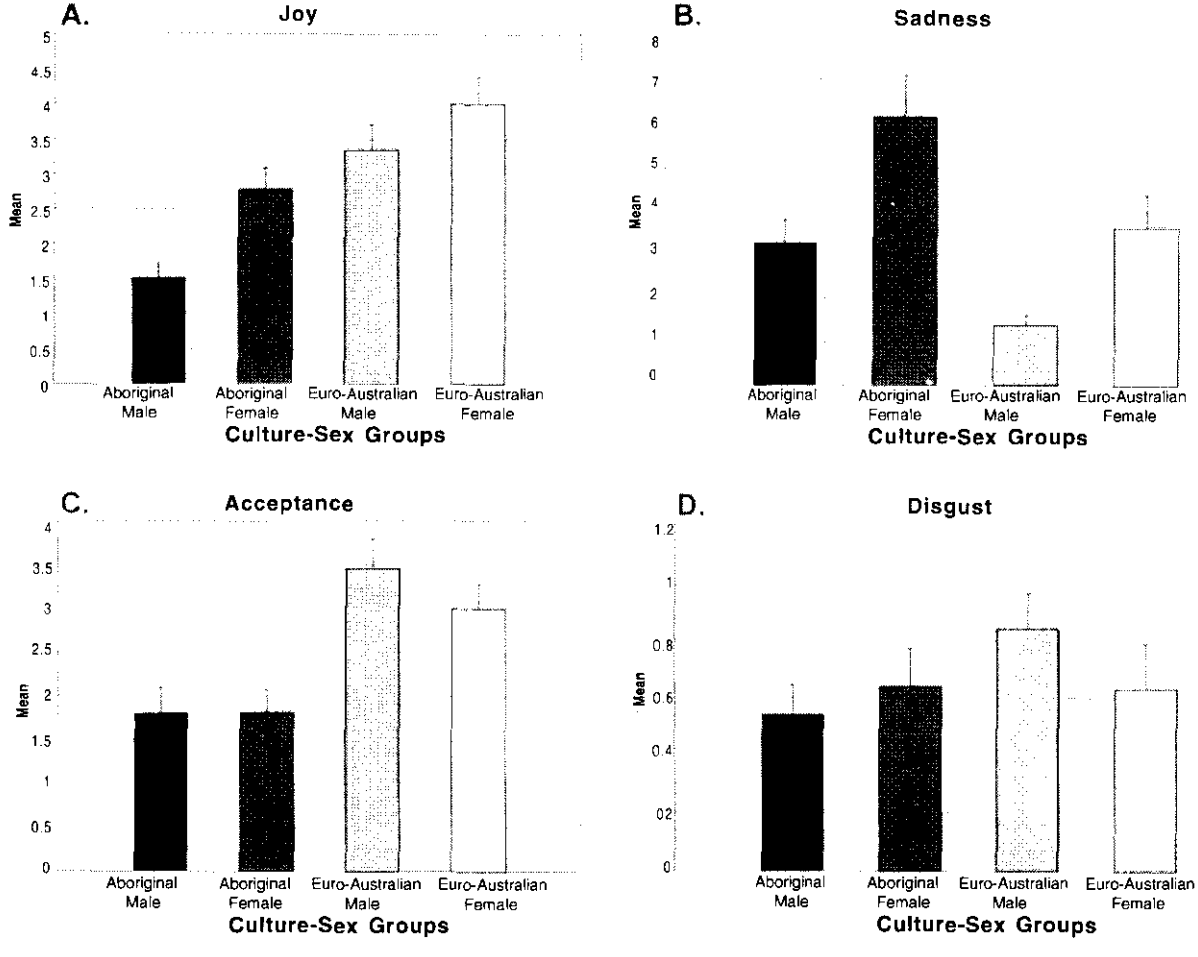
Table 4: Eight Multiple-Regression Analyses, Separately Regressing the Eight Primary Emotions on the Eight Elementary Social Relations Variables, Culture, Sex, and the Culture-by-Sex Interaction. Values shown in the body of the table are standardized partial regression coefficients.

Samples		Primary Emotions, The Dependent Variables							
Independent Variables		**Acceptance**	**Happiness**	**Anger**	**Anticipation**	**Disgust**	**Sadness**	**Fear**	**Surprise**
A. Aborigines									
Equality Matching	positive	**3.97*****	1.34	-0.04	6.35***	2.01*	-0.58	-0.97	1.24
Communal Sharing	positive	0.61	3.01**	2.24*	-0.13	0.34	3.77***	1.62	1.31
Authority Ranking	positive	6.52***	2.86**	**3.30*****	6.22***	4.82***	-0.03	0.30	1.59
Market Pricing	positive	1.49	2.57*	1.50	**5.66*****	1.06	-0.42	-0.15	1.15
Equality Matching	negative	3.89***	-0.91	0.86	-1.88	**2.65****	1.43	1.28	1.06
Communal Sharing	negative	0.63	-1.69	1.26	-2.25*	0.69	**3.42*****	1.59	2.24**
Authority Ranking	negative	-1.53	-0.66	-1.16	-0.32	-0.41	-0.76	**2.67****	-0.92
Market Pricing	negative	-1.74	0.71	3.82***	1.19	2.63**	-0.87	-0.08	**1.89***
Sex			-3.67				-2.59**		
(R^2_{adj})		(0.22)	(0.15)	(0.09)	(0.28)	(0.12)	(0.07)	(0.02)	(0.05)
B. Euro-Australians									
Equality Matching	positive	**2.51****	2.22*	1.59	0.11	3.10	2.83**	1.28	1.04
Communal Sharing	positive	2.79**	**3.69*****	2.91**	-1.37	1.73	2.14*	3.42***	1.19
Authority Ranking	positive	5.09***	1.07	**5.15*****	4.68***	8.74***	2.27*	3.14**	3.02**
Market Pricing	positive	3.25***	0.63	-1.45	**8.30*****	1.49	-1.75	-0.39	0.36
Equality Matching	negative	1.69	0.58	0.71	**1.27***	**3.14*****	4.21***	0.45	0.77
Communal Sharing	negative	-2.71**	-2.17	-0.38	-1.85	-1.08	**6.98*****	-0.89	-1.22
Authority Ranking	negative	-1.98*	1.25	**1.62**	-0.73	0.67	-1.05	**3.62*****	-1.76
Market Pricing	negative	-0.30	-2.15*	-0.44	1.52	0.87	-1.16	-1.13	**0.55**
Sex					2.46*		-4.72***	-2.15*	
(R^2_{adj})		(0.27)	(0.10)	(0.17)	(0.43)	(0.38)	(0.36)	(0.18)	(0.04)

*p<0.05; **p<0.01; ***p<0.0001

Note—All non-significant effects of Sex, Culture, and the Sex-by-Culture interaction were returned to residual status before carrying out the final analyses. Predictions positive regression coefficients are shown in boldface along the main diagonals of each of the three panels and have one-tailed probabilities, all other beta values having two-tailed probabilities.

Figure 2. The Emotions of Informal, Hedonic Community, by Culture and Sex.



Panels A& B: Mean levels of the opposite emotions Joy and Sadness; Panels C & D: Mean levels of the opposite emotions Acceptance and Disgust. Error bars are +1 standard effort of the mean (SEM).

ed by the four of the six indicators of MP-, as the results of regressions using indicators as independent variables (controlling for other seven socio-relational variables) were Ejection ^{2} = 3.01, $p < 0.01$; Relinquishment ^{2} = 3.64, $p < 0.001$; Dislocation ^{2} = 2.34, $p < 0.01$; and Circumscription ^{2} = 2.16, $p = 0.015$. All four of these variables can be viewed as involving negative experiences of collective access to territory. While Aborigines have to some extent, and fully for many in urban and suburban areas, been incorporated into the market economy of modern Australia, the other two indicator variables, which reflect individual or family economic difficulties, were for Aborigines not even directionally predictive of Surprise: for Expensiveness, ^{2} = –0.04, ns; for Loss, ^{2} = –1.34, ns.

The results for Euro-Australians were nearly opposite. For them, indicators of collective loss of territory were not predictive of Surprise: for Ejection, ^{2} = 1.03, ns; for Relinquishment, ^{2} = –0.36, ns; for Dislocation, ^{2} = –0.50, ns; and for Circumscription, ^{2} = –1.80, ns. The indicators of negative personal economic circumstances, in contrast, were predictive of Surprise: directionally for Expensiveness, ^{2} = 1.21, $p = 0.11$; and significantly for Loss, ^{2} = 2.74, $p < 0.03$.

As a final, extra step in data analysis, ratings for these subsets of indicators of MP– were constructed and then Surprise was regressed on them and the other seven socio-relational variables separately for the two groups. The variables defined for this analysis were MPC = Ejection + Relinquishment + Dislocation + Circumscription and MPI = Expensiveness + Loss. The results using MPC and MPI were for Aborigines ^{2} = 4.13 ($p < 0.001$) and ^{2} = –1.34 (ns) and for Euro-Australians ^{2} = –0.12 (ns) and ^{2} = 2.22 ($p = 0.01$). In the above detailed analyses predicting Surprise from MP indicators, no significant Sex differences were found.

Culture and Sex Differences

Figure 2, panels A and B, shows the mean levels (and standard error bars) of the two pairs of emotions associated with informal, hedonic society — Acceptance and Disgust, which are associated with EM, and Happiness and Sadness, associated with CS. The results for the opposite emotions Acceptance and Disgust are remarkably similar. Based on analysis of the combined samples (results not shown), there was for both emotions a highly significant Culture-by-Sex interaction: for Aborigines, the females were slightly higher than the males; but for Euro-Australians, the males were significantly higher for both Acceptance and Disgust. If the interaction term had been suppressed, there would have emerged a significant effect of Culture, and these figures show that Euro-Australians are much higher for both emotions.

For the opposite emotions Happiness and Sadness, the results differed for the two cultures: The Aborigines expressed less Happiness but more Sadness than Euro-Australians. Within the cultures, there was a common Sex difference, as both Aboriginal and Euro-Australian females were more verbally expressive of both emotions than were males.

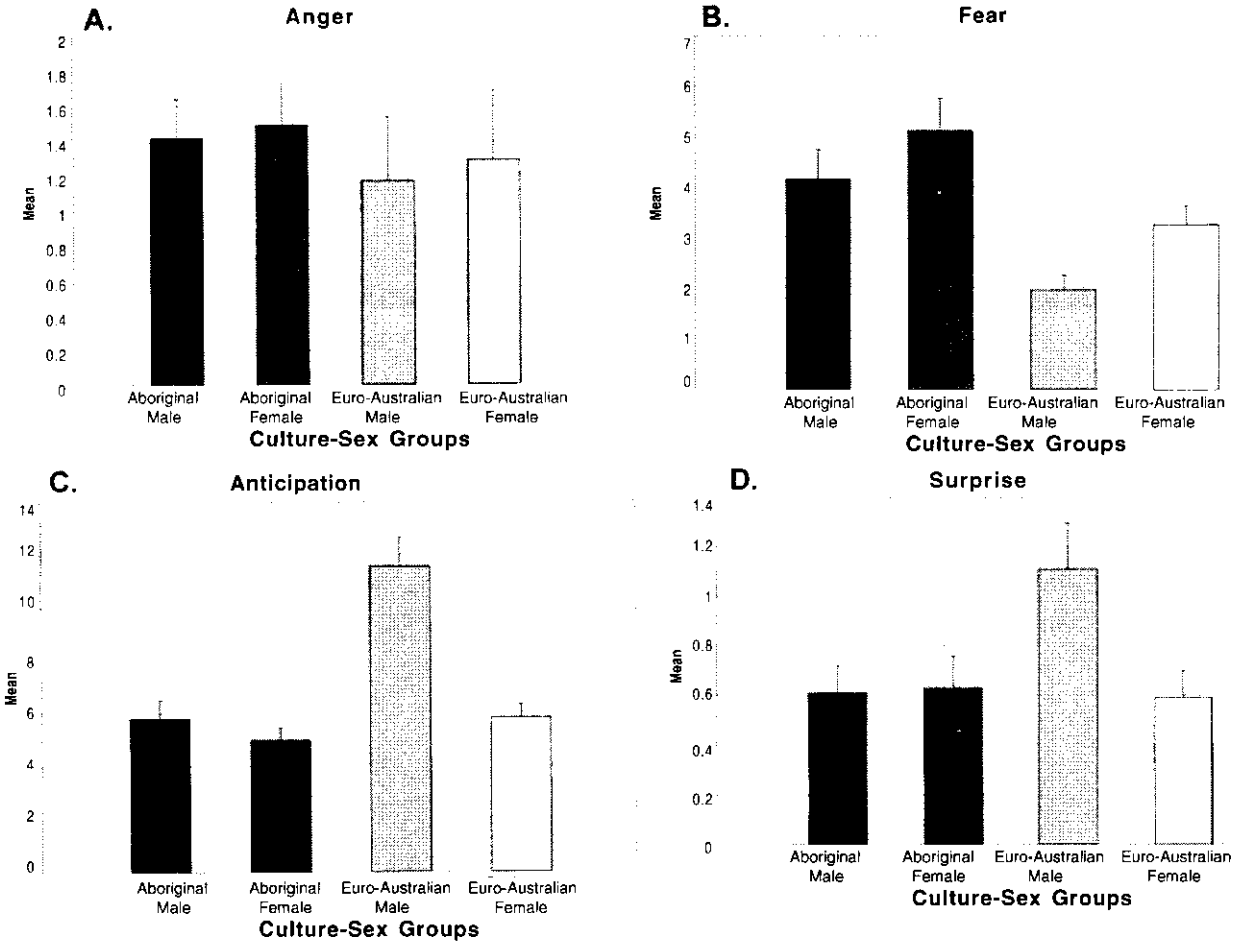
Figure 3 shows the mean levels of the four emotions of formal, agonic society, based on AR and MP, on political economy. For the opposed emotions Anger and Fear (panel A), the distributions of means are, as for Acceptance and Disgust, remarkably similar. Aborigines were more expressive of both Anger and Fear, and within both cultures, females were more expressive of these emotions than were males. These Culture and Sex differences reached significance for Fear but fall short for Anger. Given that Aborigines experience high levels of in contemporary Australia and high levels of pathology in their families and communities, these results are hardly surprising.

For the opposites Anticipation and Surprise, which are associated with territoriality and market pricing social relationships, outcomes differ from the results for Happiness and Sadness. For both of these emotions, Aborigines are lower than Euro-Australians: within the cultures, there is a trend for males to be higher for Anticipation, especially Euro-Australians. This difference is consistent with an ethological literature that shows males, for humans and mammals in general, are more oriented to spatial cognition, exploration, and defense of territory (Ecuyer-Dab & Robert 2004).

DISCUSSION

The results of the study are strongly supportive of theory with one problematic result: the negative experience of market-pricing social relationships predicted surprise significantly for Aborigines, but only directionally

Figure 3. The Emotions of Formal, Agonic Society, by Culture and Sex.



Panels A & B: Mean levels of the opposite emotions Anger and Fear; Panels C & D: Means levels of the opposite emotions Anticipation and Surprise. Error bars are +1 SEM.

for Euro-Australians. The impossibility of estimating inter-indicator reliability for the six measures of *MP–* suggest it might not be a unitary concept, and in fact it was determined that its six items are of two different kinds. Four of the items — measures of ejection, relinquishment, dislocation, and circumscription — probe the shared cultural experience of Aborigines, who have historically been collectively conquered and disposed; forcibly taken off their lands, rounded up, and placed in reserves, mission, other institutions, and private homes; ejected from their sacred lands thereby losing their nomadic way of life with its hunting-and-gathering mode of economic production; experiencing their families broken up and their children taken away; and in countless ways having had their lives and identities circumscribed (Hughes 1987; Milliss 1994).

This loss of land, territory, and way of life was found predictive of surprise for Aborigines. But for Euro-Australians, spared such experiences, these four indicators of territory/exchange-based social relations were unrelated to surprise. For them, individual and family-level problems of economic scarcity in the cash economy predicted surprise – particularly the market-based variables indicating expensiveness and financial loss, *Expensiveness* and *Loss*. Market-pricing social relations are a sociological generalization of territoriality, but when one concept generalizes another, there remains a difference between them, and the difference can make a difference. While territoriality/market-pricing predicted surprise for both groups, it did so in such dissimilar ways that entirely different measures are required for the two cultures. This is exactly the result that compels the extension of a positivistic theory to an inclusion of culture, and thereby to an open form of social constructionism.

After accounting for culture and measuring the negative experience of territoriality/market-pricing differently for Aboriginal and Western Australians, all sixteen hypotheses receive statistically significant support. The fact that the specific emotions identified as these adaptive reactions could be predicted suggests that the interpretations of these reactions as emotions are likely correct.

It should be noted that in an earlier paper appearing in this journal, it was shown that the positive experiences of these four social relations variables predicted four elementary times of time-consciousness (TenHouten 2004b), which contributes predictive validity to these concepts. In this analysis, the negative experiences of these social relations variables did not predict time orientation, but here both the positive and negative experiences of these four kinds of social relations each predict a specific emotion, which provides additional predictive validity to the positive variables, and a first level of predictive validity for the negative variables.

An obvious further step in the development of affect-spectrum theory (TenHouten Forthcoming) is to empirically examine the secondary emotions and test the propositions that have been developed (TenHouten 1996, 1999, Forthcoming) to explain them on the basis of pairs of these eight socio-relational variables. For example, pride is defined as an angry joy, and insofar as anger results from the positive experience of authority-ranking social relations (AR+), and joy/happiness results from the positive experience of communal-sharing relations (CS+), it follows that pride can be predicted to result from the joint occurrence of AR– and CS+, using a multiplicative or exponential models. Beyond that, tertiary emotions can be similarly modeled as functions of three of the eight social relations variables.

Bruner (1986) refers to two ways of conceptualizing reality: the "paradigmatic" model seeks truth in terms of logic, scientific methodology, and empirical verification; the "narrative" model rather emphasizes the construction of stories which offer coherence, expressive meaning, and context-dependent empathy (Howard 1991; Gonçalves 1994 119). Over the last few decades, the social constructionist movement (Berger & Luckmann 1966; Gergen 1985), often in cooperation with symbolic interactionism, has asserted itself in the sociology of emotions (Kemper 1981; Harré 1986; Averill 1980, 1986; MacKinnon 1994 123-27; Nunley & Averill 1994; Reddy 1997; Elfinbein & Ambady 2003). Social constructionists are prone to either gloss over the biological and evolutionary aspects of emotion, or deny their very existence (Rosen 1994). Indeed recent ethnographies contend that there is no limit to the extent to which personal feelings are locally, socially, and culturally constructed on the basis of cultural norms (Grima 1992). Abu-Lughod (1991) argues that local, particular constructions fully determine identity and

experience. She endorses Rosaldo's (1984 147) claim that individual emotional life is "overwhelmingly shaped by culture," which means that the individual, disconnected from biological constraint, is culturally malleable and plastic (Shott 1979; Abu-Lughod 1990). This strong constructionism embodies an

> adamant refusal to allow for any physiological, psychological, or other universal determinants or influences in emotional life. (Reddy 1997 329)

Reddy observes that

> [e]thnographers who concentrate on the subject of affect often insist...that there is nothing to emotion beyond the local discursive structures through which it is figured and practices. (1997 327)

while acknowledging that other historical ethnographers (e.g., Myers 1986 105; Schieffelin 1985 169) remain agnostic on this issue, viewing the question of the 'real' Shott (1979) and other constructionists have pointed to a psychophysiological formulation holding that underlying neurophysiological processes are the same for different emotions. But this experimental research, by Schacter and Singer (1962; also see Nisbett & Schacter 1966), has not been successfully replicated (Maslach 1979; Marshall & Zimbardo 1979), has been misconstrued by constructionists (see Kemper 1981 339-41), and is contradicted by an enormous body of neuroscientific evidence (e.g., LeDoux 1996; Damasio 2003). Some (Solomon 1984; Harré 1986) have flatly excluded the biological dimension, and with it evolutionary considerations, arguing that

> an emotion is not a feeling...but an interpretation... [and] a system of concepts, attitudes, and desires, virtually all of which are context-bound, historically developed, and culture specific. (Solomon 1984 248-49)

From this strong constructionist standpoint, efforts to link emotion to neurophysiological processes is, according to Harré (1986 4), no more than the pursuit of an "ontological illusion" and to Nunley and Averill (1994 227), merely a "myth."

In spite of these protestations, emotions have a neurophysiological basis in brain structure and brain function, a position strongly reinforced by astounding, even revolutionary, advances in the study of brain mechanisms underlying the most elementary emotions (LeDoux 1996; Rolls 2001) and more complex emotions such as pride and shame (Weisfeld 2002). Without doubt the most basic emotions involve biological processes. Controversy remains, however, regarding which emotions are primary. It is widely conceded, among affective neuroscientists, that six emotions — anger, fear, joy, sadness, surprise, and disgust — are primary. These emotions have been found to be widely identifiable across several cultures and in a wide variety of nonhuman animal species as well (Ekman 1992). Most neurobiological knowledge about the emotions comes from the study of these six emotions (Panksepp 1998; LeDoux 1996; Rolls 2001; Adolphs 2002). It is argued here, based on an insistence on Darwin's (1872) principle of antithesis, that there are eight, as acceptance is the opposite of disgust/rejection and anticipation is the opposite of surprise.

There is less consensus about the higher-order emotions. Combinations of two primary emotions are called "secondary" emotions by Plutchik (1962, 1980), and "tertiary" combinations of three primaries are proposed by TenHouten (in press). All combinations of the six primary emotions are called the "social" emotions by Damasio (2003). Here, however, it is shown that the proposed eight primaries are also social, as they are predictable by specific kinds of social relations. Many fundamental questions remain: 1) Are there other kinds of emotions, in addition to primary, secondary, and tertiary emotions? Damasio (2003 45) suggests that there also exist "background" emotions (such as discouragement and enthusiasm) which he claims are the consequences of combinations of simpler regulatory reactions (e.g., basic homeostatic processes, pain and pleasure, appetite and desire). 2) Which higher-order or social emotions have a clear-cut biological infrastructure? There is no doubt that dominance, submissiveness, pridefulness, and shame have a biological basis, but what of the other secondary emotions, and what of tertiary emotions such as jealousy, envy, and confidence? 3) To what extent are the primary emotions also social? Certainly fear can be triggered by nonsocial

stimuli (the surprising appearance of a spider). This report provides very preliminary evidence that all of the primary emotions typically involve social circumstances, and specifies these circumstances as valence, elementary social relations. 4) What social circumstances are emotionally competent stimuli? Addressing this question is a fundamental challenge, and a great opportunity, for the sociology of emotions. The present theory, extended, provides one frame-of-reference for addressing this question. Consider pride, an angry joy. Because anger results from powerlessness (a negative experience of authority-based social relations [AR–]) and joy results from a positive experience of communal social relations [CS+], it follows that pride results from the joint occurrence of AR– and CS+. 4) To what extent are the primary emotions also social?

The answers to these questions, and others, demand the development of a neurocognitive sociology of the emotions. This perspective will bring the social world into our understanding of the emotions. Emotions and even higher-order feelings (e.g., of well-being or distress), as affective neuroscientist Damasio puts it, "play a decisive role in social behavior" (2003 140). Sociology, as a field, has a choice: it can either put its collective head under the sand, which will turn out to be the dust-heap of science past, or accept Damasio's conclusion, which is also an invitation and a challenge. Research carried out by Damasio and his colleagues, and by other teams of affective neuroscientists, point sociology in the right direction. They have discovered that when previously normal persons sustain damage to brain regions necessary for the experience of certain emotions and feelings, their ability to govern their social lives is compromised, social contracts break down, marriages dissolve, parent-child relations are ruined, and careers are ended. The sociology of emotions thus faces a daunting task that can potentially lead the entire discipline back to its root problem, the relationship between mind and society. It is abundantly clear that the mind is in large measure a representation of the state of the body, and that the mind is as much affective in its functioning and structure as it is cognitive and rational.

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