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The Effects of Revisionism on Remembered Emotion: The Valence of Older, Voluntary Immigrants' Pre-Migration Autobiographical Memories

ROBERT W. SCHRAUF[1]* and LESA HOFFMAN[2]

[1]*The Pennsylvania State University, USA*
[2]*University of Nebraska, Lincoln, USA*

SUMMARY

Prior research on remembered emotion demonstrates effects of revisionism in memory. The positivity bias describes preferential recall for positive emotions and the fading affect bias describes greater fading of negative versus positive emotion over time. Such effects predict that older adults would remember childhood and youth more positively than later adulthood. However, economic immigrants, whose childhood and youth reflect experiences of poverty and unemployment, may not show the effects of such revisionism. This study examined the remembered emotion of immigrant and non-immigrant older Puerto Ricans whose early years corresponded to hard times on the island. Multilevel modelling showed that both groups exhibited the effects of the positivity and fading affect biases, but immigrants remembered childhood and youth more negatively than non-immigrants. This suggests both accurate memory for a more negative past as well the effects of additional revisionism whereby a valued and chosen present is preferentially compared to the past. Copyright © 2006 John Wiley & Sons, Ltd.

In 1946, 40 000 Puerto Ricans emigrated from the island of Puerto Rico to the US mainland. For the next 5 years, an average of 30 000 individuals left the island per year, and the trend peaked in the 1950s when the average again reached 40 000 per year (B. B. Levine, 1987). These leave-takings were generally occasioned by widespread poverty and chronic unemployment (Padilla, 1987). Indeed, a monograph by Julio Morales on the topic is entitled, 'Puerto Rican Poverty and Migration: ''We Had to Try Elsewhere'' (Morales, 1986)'. In a shared situation of hardship and massive migration, some individuals reacted by migrating to the mainland, while others chose to remain on the island.

This phenomenon of virtual societal immigration provides an interesting test case for mechanisms of memory revisionism on remembered emotion among older adults. The questions we pose here are the following. How will an older Puerto Rican adult, 30–40 years after immigration, recall the emotion associated with events from his or her pre-migration childhood and youth? Will immigrants tend to remember the bad times that occasioned their leaving? Will those islanders who did not leave, but remained on the

*Correspondence to: Robert W. Schrauf, Department of Linguistics and Applied Language Studies, 305 Sparks Building, Pennsylvania State University, University Park, PA 16802, USA. E-mail: rws23@psu.edu

island into late life, have fonder memories? Or will no differences emerge? After all, memory is malleable, and research shows that over time the past is often recalled more favourably than it was in fact experienced. How powerful are the mechanisms of revisionism in memory?

Given that in fact 'times were bad', different literatures on revisionist tendencies in memory make different predictions about how older immigrants might recall their pre-migration childhood and youth. These literatures concern the positivity bias, the fading affect bias and implicit comparisons of the present with the past. The following sections offer a brief review of these effects.

THE POSITIVITY BIAS

For both theoretical and methodological reasons, it is important to attend to the separate dimensions of the valence and the intensity of remembered emotion. The positivity bias concerns primarily remembered *valence* (pleasantness vs. unpleasantness) whereas the fading affect bias concerns differentially fading *intensity* for positive vs. negatively valenced events.

Regarding the remembered *valence* of past events, some research shows that people recall proportionally more positive events than negative or neutral events. Focusing particularly on childhood memories, Waldfogel (1948) asked participants to remember as many early events as they could and found that more pleasant (50%) versus unpleasant (30%) and neutral (20%) memories were recalled. Berntsen (1996) had students keep diaries of involuntary memories and found similar proportions of valence: positive (49%), negative (19%) and neutral (32%). Environmental triggers seem to play no role in this effect: Suedfeld and Eich (1995) had participants recall memories to cue-words during sensory deprivation and found that more pleasant (66%) versus unpleasant (33%) memories were recalled.

This positivity bias is particularly evident among older adults. Berntsen and Rubin (2002) asked 1241 respondents, aged 20–92, to recall and date their happiest, saddest, most important, most traumatic and most recent involuntary memories. Individuals in their 60s reported that their happiest events took place in their 20s, while the distribution of their saddest memories formed a monotonic curve across the lifespan. Extending these results, Rubin and Bernsten (2003; Study 1) asked 1307 respondents, aged 20–94, for their most afraid, most proud, most jealous, most in love and most angry memories. Again, memory distributions for respondents in their 60s showed a larger fund of memories for positive events (most proud, most in love) in their 20s, with monotonic curves for negative events (most afraid, most angry). By having undergraduates date the emotional memories of a 'typical' 70 years old, Rubin and Bernsten (2003; Study 2) were able to show that the occurrence of positive (but not negative) events obeyed culturally constructed life-scripts. Such scripts may play a role in memory search.

In a prospective study with older adults, Kennedy, Mather, and Carstensen (2004) interviewed participants about a variety of personal physical and emotional states and re-interviewed them again 14 years later. Participants filled out a 'retrospective questionnaire' about what they remembered feeling 14 years prior, and results showed a marked retrospective positivity bias for older participants (79–101 years old) versus younger participants (47–65 years old).

On the other hand, these results are qualified by studies using the cue-word technique. Jansari and Parkin (1996; Study 2) asked participants aged 45–60 to recall memories to cue-words for childhood and adolescence (years 0–20) and midlife (10–20 years ago) and

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to rate them for pleasantness. They found no significant differences for pleasantness ratings of memories between the two periods. Rubin and Schulkind (1997) used word-prompts with both younger and older adults to examine the reminiscence bump (a greater than expected number of personal memories from ages 10–30). A comparison of memory pleasantness ratings by older adults for memories from the bump decades (10–29) versus the two decades afterwards showed no significant differences.

These various studies employ a range of techniques for eliciting memories from across the lifespan (free recall, diary studies, recall of explicitly positive vs. negative memories, engagement in retrospective tasks, and word-cuing) as well as participant versus investigator ratings of the valence of those memories. Taken together they provide a mixed picture. Nevertheless, some do suggest a tendency toward biased recall of positively versus negatively valenced memories, particularly among older adults. However, the potential mechanisms for this bias are many, and include nostalgia, repression, cultural scripts (as noted above), and/or other factors of which we are unaware.

THE FADING AFFECT BIAS

Research on the *intensity* of remembered emotion has consistently shown that the remembered intensity of negative events fades more over time than the remembered intensity of positive events. This effect is termed the *fading affect bias* (Skowronski, Gibbons, Vogl, & Walker, 2004; Walker, Skowronski, Gibbons, Vogl, & Thompson, 2003; Walker, Skowronski, & Thompson, 2003; Walker, Vogl, & Thompson, 1997). By using diary studies, Walker et al. (1997) were able to compare the actual emotional intensity of events as they were experienced in real time with the remembered emotional intensity of those events months and even years afterwards. Results from different groups tested at differing retention intervals (3 months, 1 year, 4.5 years) consistently showed that ratings of intensity at recall were significantly lower than ratings of intensity at the time-of-the-event for both pleasant and unpleasant events, but that the change was greater for unpleasant versus pleasant events. Since ratings were made both at encoding and recall, the relative change in memory for unpleasant versus pleasant events cannot be due to a retrospective bias according to which people might retrospectively 'down-regulate' the intensity of negative memories but not positive ones.

The fading affect bias has also been found using a retrospective memory paradigm (Skowronski et al., 2004) in which participants recalled two pleasant and two unpleasant memories. They then selected emotional descriptors from a list corresponding to how they felt at the time of the event and how they felt now at recalling it. As in the diary studies, the results showed that negatively valenced events faded in intensity faster over time than did positively valenced events. Thus, a variety of studies using different paradigms point to a robust finding of differential fading of remembered intensity over time. Further, since it is the remembered intensity of *negative* events versus positive events that fades, the fading affect bias may be one of the possible mechanisms explaining the positivity bias.

IMPLICIT COMPARISONS OF THE PAST WITH THE PRESENT

Literature on the effect of current self-appraisals on autobiographical memory (Ross, 1989) suggests that people's memory for past events is conditioned both by their current beliefs

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about themselves and their views on change. Where consistency seems appropriate, people have a tendency to align the past with the present. Where change is deemed appropriate, people have a tendency to recall the past as contrasting with the present. Research on remembered emotion shows these effects as well.

In a study of voters' memory for Ross Perot's dropping from the US presidential race of 1992, Levine (1997) had participants rate their memories for their emotional response to the event immediately after it had occurred and then again after the election (just prior to which Perot re-joined the race). She found that participants who were loyal to Perot throughout these events tended to under-estimate the anger they felt when he dropped out of the race. Similarly, those who switched candidates after his dropping out, but who later wished he had been elected, also underestimated their initial anger. Research on memory for the verdict in the O. J. Simpson trial has shown the same result (L. J. Levine, Prohaska, Burgess, Rice, & Laulhere, 2001). This effect is seen not only for specific events but for series of events over time as well. Holmberg and Holmes (1994) investigated memories of marriage and found that husbands who experienced less happy marriages recalled earlier interactions with their wives as less positive than initially reported. These sources show that people often align past appraisals of emotion with current appraisals and achieve the effect of consistency over time.

However, as Ross (1989) points out if people believe the present *should* be different from the past, then they may recall the past as more at variance with the present than it actually was. Levine and Safer (2002) refer to this as 'coping with the present by reconstructing the past'. For instance, Safer and Keuler (2002) had individuals who were terminating psychotherapy recall their initial distress at beginning psychotherapy. Results showed that over 60% of patients overestimated their pre-therapy levels of distress, providing a more pronounced judgment of improvement. Given this dynamic, a voluntary immigrant who left the homeland for a better life (and found it) may remember a pre-migration past as more negative than the current situation.

In sum, the positivity bias addresses emotion *valence*. Relative to the older adults of this study, the positivity bias would suggest a preferential recall of positively valenced over negatively valenced memories in general, and possibly a more pronounced positivity effect for earlier periods of life. The fading affect bias, addressing *intensity*, would suggest that, although the intensity of remembered emotion will fade in general over time, the remembered intensity of unpleasant events will have faded *more* than the remembered intensity of pleasant events. Finally, research on the effects of implicit comparisons of the present with the past indicates that people have a tendency to revise the past in light of their current situation and beliefs about change. Each of these types of memory revisionism may play a role in how immigrants remember their pre-migration past.

It remains an empirical question, nevertheless, how immigrants do *in fact* recall the emotion associated with pre-migration events, in this case, from childhood and youth. To our knowledge, only one study of autobiographical memory has touched on this issue. Schrauf and Rubin (2001) had participants narrate their life stories and then coded the events for emotional valence. They found no significant differences in emotional tone (valence) for the *decade of immigration itself* versus the decades before and after immigration. However, Schrauf and Rubin (2001) focused on the time of immigration and settlement, but did not compare pre- and post-migration memories. From the immigrant's perspective, this wholesale 'before' and 'after' may well be the more intuitively natural break.

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THE PRESENT STUDY

Examining remembered emotion among older voluntary immigrants makes it possible to probe these three kinds of revisionist tendencies in older adults' memory for emotion. In this study, we compare immigrants to their non-immigrating cohort mates (given that both shared the same past at some global level), and ask whether and to what extent there are differences in their remembered emotion for childhood and youth. Given the literature, we would expect to see, for both groups, the effects of the fading affect bias and a positivity bias relative to remote events. That is, both groups should show a general fading of the remembered intensity of emotion over time, and as predicted by the fading affect bias, both groups should show a greater fading of remembered intensity for unpleasant events versus pleasant ones. In terms of the positivity bias, both groups should also show the preferential recall of positively versus negatively valenced events for remote time periods versus recent time periods. However, this positivity bias may be qualified *in the immigrant group* in one of two ways.

On the one hand, if immigrant memory for the emotional tone of childhood and youth shows the *same* pattern as non-immigrant memory for that period, then that would speak powerfully to the effects of revisionism after 40–50 years. That is, the positivity bias will have overridden the negative emotions associated with the distressing events and circumstances that motivated the move. On the other hand, if immigrants' remembered emotion for childhood and youth is in fact *different* (more negative) than non-immigrant remembered emotion, then we would conclude to unrevised (more accurate) memory for a distressing past. This would imply little or no influence of the positivity bias, and possibly an amplification of remembered negative intensity due to unfavourable comparison with the present. According to this latter form of revisionism, 'successful' immigrants, now confirmed in their choice and leading more prosperous lives than their non-immigrating counterparts, will tend to recall the past more negatively in comparison to their current situation. Of course, with retrospective data, we cannot disentangle these two (accurate remembering vs. recasting), but we can establish whether immigrants do enjoy a better situation than their non-immigrating counterparts, and whether the immigrants are aware that their current situation is better.

Two additional factors may play a role in memory for the events of childhood and youth: the judged significance and rehearsal of these memories. Relative to significance, immigrants might rate their memories for the period of pre-migration as possessing more significance than would non-immigrants, given that events from that period motivated their move. Relative to rehearsal, a prediction might be made in either direction. That is, memories from this period might be retold often, or they might be avoided. Given that immigrants were asked to rate the significance of each memory and the judged rate of rehearsal, we will assess whether immigrants differ markedly from non-immigrants on both these issues as well.

HYPOTHESES

The hypotheses governing this study are the following. *Hypothesis 1* predicts that, for all older participants (both immigrants and non-immigrants) the remembered *intensity* of emotion will be greater for events from adulthood and old age than for events from childhood and youth, and specifically in accord with the fading affect bias, this difference

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in intensity of reported emotion will be greater for negative than positive memories. That is, the intensity of negative memories will be seen to fade more than the intensity of positive memories.

Hypothesis 2 predicts that all older participants, both immigrants and non-immigrants, will report memories from childhood and youth with more positive emotional valence than memories from adulthood and later life. This reflects the effects of a positivity bias.

Hypothesis 3 predicts that immigrants will report memories from childhood and youth (i.e., before immigration) more negatively than will non-immigrants for the same period. This will reflect the real or perceived situation of hardship that motivated immigration in the first place. Thus, the greater the difference between the two groups (the more negative the immigrant memory); the more likely that immigrants are accurately recalling past emotion and/or revising negatively the valence of that emotion. To cast light on the latter, we include data on immigrants' acculturation to US society, socioeconomic status and frequency of visits to the island to conceptualise such revisionism.

Hypothesis 4 predicts that immigrants will judge the events from childhood and youth as more significant than non-immigrants will judge events from that same time period. It seems reasonable to assume that the events occurring during a period of hardship, that motivated migration to the mainland, will be judged as quite significant by those who moved, whereas those who did not move may not place the same emphasis on events from that period.

Finally, although we have no principled reason to predict differences in the frequency of rehearsal of events from childhood and youth versus events from adulthood, we note that such differences could have some effect on our variables of interest *(Hypothesis 5)*. Therefore, we conducted exploratory analyses to examine the extent to which immigrants differ from islanders in how often they talk about events from earlier and later in life.

A thorny problem in research on lifespan memory is the impossibility of verifying the vast majority of personal events that people recall. For the most part, we never know what actually happened to an individual in the past, or how that individual reacted at the time. We know only what they recall as they recall it. For these reasons we have chosen to compare immigrants to their non-immigrating, age- and education-matched compatriots who did not immigrate because, although individual experiences may differ, at least both groups share the same global past. Further, the word-cuing technique (Crovitz & Schiffman, 1974) that we employ aims at a random sampling of memories across the lifespan, with the result that many remembered events are not recalled in the experimental sessions. Thus, it is important to bear in mind that ultimately we compare the remembered emotional tone of entire periods of time (e.g., pre-migration and post-migration). However, by analysing the data with multilevel models we have attempted to deal with individual memories as nested within persons and within periods instead of taking means for each (Hoffman & Rovine, in press; Schrauf & Durazo-Arvizu, 2006; Wright, 1998).

METHOD

Participants

Fifty individuals participated in the study: 25 Spanish monolinguals (15 female) living on the island and 25 Spanish-English bilinguals (20 female) who had immigrated to the mainland in late childhood through adulthood. The average age at migration for

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immigrants was 22.28 ($SD = 5.61$). Immigrants did not differ from Islanders in chronological age ($M = 69.68$; $SD = 7.69$ vs. 72.09; $SD = 5.35$; $t(48) = 1.28$) or years of formal education ($M = 7.76$; $SD = 4.18$ vs. $M = 6.10$; $SD = 3.52$; $t(48) = 1.51$). Cognitive status was assessed with the Spanish version of the Mini-Mental State Exam (MMSE; Folstein & McHugh, 1975; Karno, Burnam, Escobar, Hough, & Eaton, 1983), adjusted for Spanish administration among this group with low education (Mulgrew et al., 1999). There was no significant difference on Mini-Mental scores between Immigrants ($M = 28.44$, $SD = 1.29$) and Islanders ($M = 27.68$, $SD = 2.51$; $t(48) = 1.51$). Participants rated their average annual incomes on ordinal scales. A Mann-Whitney *U* test performed on these ratings showed that Immigrants had higher annual incomes (>$10 ,000) than islanders (≤$10 000; U = 2.83; $p < 0.001$). All participants gave informed consent and were recruited in accord with the policies for the protection of Human Subjects.

Materials

Immigrants and Islanders participated in one screening session, followed by four cuing sessions for the Immigrants (two in Spanish, two in English) or two cuing sessions for the Islanders (two in Spanish). Screening instruments were the following. In addition to demographic questions, participants also provided information concerning when and how languages were learned, and (for immigrants) frequency of visits to the island. Proficiency in Spanish was determined via the Picture Naming and Verbal Analogies subtests of the *Woodcock-Muñoz Language Survey* (Woodcock & Munoz-Sandoval, 1993). Acculturation to American society and adherence to the values, customs and beliefs of Puerto Rican culture were measured by the *Puerto Rican Bicultural Scale*, which has one scale for each cultural orientation (Cortes et al., 2003; Cortes, Rogler, & Malgady, 1994). Islanders completed both American and Puerto Rican subscales because the island is politically bound to the United States, and islanders experience considerable economic and cultural influence from the mainland.

Procedure

Participants recalled memories to cue-words (Crovitz & Schiffman, 1974) in four separate cuing sessions, which took place over a 6–8 months period. In each session, participants received between 12 and 20 word cues alternating with pictures from the Snodgrass set (Snodgrass & Vanderwaart, 1980) normed in Spanish (Sanfeliu & Fernandez, 1996). The cue set comprised 40 words, their 40 translation equivalents, and corresponding 40 line drawings. These were selected by choosing line drawings with the highest naming agreement scores within each language (using the H statistic; Lachman, 1973) and by matching their translation equivalents. In response to each cue, participants were instructed to think of a personal memory: something that happened to them or something they did, from any time period of life, of any importance (from trivial to highly significant). Memories were reported verbally. Immediately after each memory, individuals were asked if the memory came to them in no language, Spanish, English, or both. (Analysis of the effects of recall in Spanish vs. English for the immigrant group is reported elsewhere; see Schrauf & Rubin, 2004).

After retrieving the entire set of memories for a particular session, participants provided Likert ratings (on 7-point scales) of phenomenological properties of each memory. Of interest for this study are the ratings of emotional intensity, significance, and rehearsal (see

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Schrauf & Rubin, 2004 for a discussion of the results relative to sensory properties of the memories). Information on emotional valence was obtained by asking participants to name the emotions associated with each event. Finally, participants were asked where the event took place and when it happened (a date).

Ratings of intensity were made on a 7-point scale: 'I can feel now what I felt then . . . 1 = not at all, 7 = as clearly as if it were happening right now'. Ratings of significance were made in response to the prompt: 'This memory changed my life: 1 = not at all, 7 = changed my life completely'. Ratings of rehearsal were made to the statement: 'I have talked about this event, 1 = not at all, 7 = as much as any event in my life'.

Valence was coded after the fact based on the emotions that individuals associated with each event. Because people often recall more than one emotion for an event, participants in this study were allowed to name more than one emotion. Participants were encouraged to name the emotions that they felt and/or to choose as many as they wished from a list (for a similar approach, see Skowronski et al., 2004). English translations of the Spanish emotion words are: anger, disgust, envy, humiliation, pride, safety, fear, surprise, guilt, grief, love, happiness, sadness, anxiety, humour, anticipation, suspicion, tiredness and no-emotion. To code memories for valence, the first named emotion was taken to be the primary emotion and the second as a modifier of the first. Thus, for example, a mother might remember being both happy and sad at the marriage of her last child, or an individual might remember having felt both angry about being fired from a job, and very much afraid of the consequences. Coding the valence of the first example would require adjusting the positive valence of the primary emotion named (happiness) by the negative valence of the secondary emotion named (sadness); likewise, coding the second example would require enhancing the negative valence of anger with the additional negative valence of fear. Two Spanish-English bilinguals, blind to the objectives of the study, assigned valence scores to each memory on a 5-point scale where 5 = very positive and 1 = very negative. Coders were trained on the concept of valence versus arousal (intensity) via inspection of multidimensional scaling maps in which valence versus arousal figured as critical dimension of contrast (Herrmann & Raybeck, 1981; Russell, Lewicka, & Niit, 1989). They then coded three blocks of 10 memories each and reached 90% agreement on the third block. The remaining memories were coded with 90% agreement and differences resolved in conference. (For a discussion of these and other coding schemes for emotion in autobiographical memory, see Schrauf & Durazo-Arvizu, 2006).

RESULTS

Language proficiency and use

A formal test of language proficiency in Spanish, the first language of both islanders and immigrants, was conducted to exclude effects of first language attrition among immigrants as a factor in this research. Somewhat anomalously, immigrants (Spanish-English bilinguals) performed better than islanders (Spanish monolinguals) on the Spanish subtests of the Woodcock-Muñoz Language Survey (Woodcock & Munoz-Sandoval, 1993). On the Picture Naming Subtest, Immigrants ($M = 29.67$, $SD = 3.74$) versus Islanders ($M = 26.88$, $SD = 5.09$) had marginally significant higher scores ($t(47) = 1.95$, $p = .057$). However, on the verbal analogies subtest, immigrants ($M = 15.96$, $SD = 6.49$) clearly scored significantly higher than islanders ($M = 10.00$, $SD = 5.06$; $t(47) = 3.59$, $p < .01$). One

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might argue that somehow the immigrant group, though equated on years of education with the non-immigrant group, had become more test-wise than non-immigrants, or perhaps that bilingualism itself has some effect on testing the first language, but these are purely speculative possibilities. In any case, the test serves to discount any effect of first language attrition among the immigrants.

Despite their many years in the United States, the Immigrants' primary language has remained Spanish, in part because these individuals have chosen to live in Puerto Rican neighbourhoods where Spanish is the lingua franca. An analysis of zip code data from Census 2000 showed that the average percentage of Hispanics in the central city neighbourhoods where these individuals live is 46%. Twenty four (24) of 25 declared Spanish their dominant language.

Acculturation

Subscales for Involvement in American Culture and Involvement in Puerto Rican Culture totalled 32 points each (Cortes et al., 2003). Not surprisingly, on the American acculturation subscale, Immigrants ($M = 25.88$, $SD = 3.59$) showed higher American acculturation scores than Islanders ($M = 18.72$, $SD = 5.11$). However, long-term residence in the US did not affect immigrants' subscription to Puerto Rican values, customs and beliefs. That is, both groups performed equivalently on the Puerto Rican values subscale (Immigrants: $M = 28.28$, $SD = 3.57$ vs. Islanders: $M = 31.28$, $SD = 1.34$). A 2 (groups: Islanders vs. Immigrants) $\times$ 2 (subscale: Puerto Rican vs. American) Analysis of Variance (ANOVA), with cultural involvement as a within-subjects factor, resulted in a main effect of group, $F\ (1,48) = 8.02$, $MSE = 108.16$, $p < .01$, whereby Immigrants' endorsed more items more highly than Islanders across subtests, a main effect of subscale, $F(1,48) = 105.55$, $MSE = 1398.76$, $p < .001$, whereby all participants endorsed items measuring involvement in Puerto Rican culture more highly than American items, and a significant group by cultural involvement interaction, $F\ (1,48) = 60.66$, $p < .001$. The interaction reflects that islanders have high scores on Puerto Rican values (and little variability) and low scores on American values (and high variability), whereas immigrants fall in between on both scales. This latter represents the cultural adjustment that immigrants have made, both in assuming American beliefs, customs, and values, and adjusting or altering Puerto Rican beliefs, customs, and values (particularly evident in the increased standard deviation of immigrants' vs. non-immigrants' scores on the Puerto Rican scale).

Frequency of visits to the island

Immigrants' high scores on language proficiency in Spanish and high scores on Puerto Rican acculturation may also show the effects of frequent visits to the island. Immigrants reported frequency of visits to the island in one of seven categories: more than once a year (0%), once a year (28%), once every 2 years (24%), once every 5 years (36%), once every 10 years (8%), once since having left (4%), and never (0%). Thus, 88% of the sample visited the island at least once or more every 5 years in the 40–50 years since they left. Such frequency would provide ample opportunity for immigrants to compare their current situations with their age-mates who remained on the island.

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Memory analyses

In the following analyses, only memories cued in Spanish during Spanish sessions are used. Thus, for islanders this includes all of their experimentally induced memories (because they were monolingual in Spanish), while for immigrants only those memories cued in Spanish in Spanish sessions were used (excluding memories cued in English in English sessions). Immigrants' memories were divided into those commemorating events before the date of migration and those commemorating events after the date of migration. Because these periods coincide with childhood and youth (pre-migration) and adulthood (post-migration), a comparable division of Islanders' memories is made by using Immigrants' mean age of immigration (22 years old) to divide Islanders' memories into childhood and youth ($<$22 years old) and adulthood ($\geq$22 years old).

Numbers and distribution of memories

There was no significant difference in the numbers of memories produced for early versus later events (childhood-youth vs. adulthood-old age). This may seem surprising since the period of childhood and youth typically covers only 20 years, while the subsequent period of adulthood and old age covers 40–50 years, but research on the reminiscence bump consistently shows a larger than expected fund of memories for the decade from 15 to 25 years of age (Rubin, Wetzler, & Nebes, 1986). This applies to immigrants who moved during these ages as well (Schrauf & Rubin, 2001). A 2 (group: islander vs. immigrants) $\times$ 2 (period: early vs. late) repeated measures ANOVA, with numbers of memories as the dependent variable, showed no main effect of period, $F(1,48) = 1.20$ n.s., and no interaction, $F\ (1,48) = 0.35$ n.s. However, a main effect of group showed that islanders produced more memories in general than immigrants, $F\ (1,48) = 7.63$, $MSE = 73.96$, $p < .01$. The lack of interaction suggests that there is proportionally no difference in the numbers of memories recalled in the early versus late period for Immigrants versus Islanders. Thus, even though Immigrants become bilingual and encode memories in both languages after immigration (Schrauf, 2000), their Spanish memory distributions mimic those of their monolingual Spanish-speaking counterparts on the island. In fact, the immigrants of this study have remained dominant in Spanish and live in Spanish speaking neighbourhoods.

Intensity and valence of memories

Table 1 shows the means and standard deviations of all variables in the study for the period of childhood and youth (pre-migration for the immigrants) and adulthood and old age (post-migration for the immigrants). The five hypotheses in the current study were examined using multilevel models (Snijders & Bosker, 1999) in which each outcome variable (i.e. the emotional intensity, pleasantness, significance and degree of rehearsal reported for each autobiographical memory) was modelled as nested within experimental sessions nested within persons (i.e. a three-level model). The specific models estimated are presented with each hypothesis below. Tests of the parameter estimates were obtained using full information maximum likelihood estimation and Between-Within denominator degrees of freedom within SAS Proc Mixed. The 95% confidence interval (CI) for random variation around each fixed effect was calculated as ± 2 standard deviations of its accompanying random variance term.

*Hypothesis 1: Fading Affect Bias.*In general, all participants will remember later versus earlier events with greater emotional intensity, but the fading affect bias predicts that this

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Table 1. Means and standard deviations of ratings of emotional valence, intensity, significance and rehearsal by period

	Before		After	
	Islanders	Immigrants	Islanders	Immigrants
Variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Intensity	5.98 (1.49)	4.94 (1.59)	6.43 (1.08)	5.75 (1.10)
Valence	3.67 (0.71)	3.23 (0.54)	2.90 (0.78)	3.06 (0.67)
Significance	3.11 (1.00)	2.36 (0.76)	3.49 (1.35)	2.98 (0.68)
Rehearsal	4.81 (1.92)	4.16 (1.30)	5.01 (1.69)	4.49 (1.05)

effect will be magnified for negatively valenced emotions. This effect was examined using Model 1:

$$
\begin{aligned}
\text{Level 1}: \quad & \text{Intensity}_{msi} = \beta_{0si} + \beta_{1si}(\text{Period}_{msi}) + \beta_{2si}(\text{Valence}_{msi} - \text{Valence}_{i}) + \\
& \qquad \beta_{3si}(\text{Period}_{msi})(\text{Valence}_{msi} - \text{Valence}_{i}) + e_{msi} \\
\text{Level 2}: \quad & \beta_{0si} = \delta_{00i} + U_{0si} \\
& \beta_{1si} = \delta_{10i} \\
& \beta_{2si} = \delta_{20i} \\
& \beta_{3si} = \delta_{30i} \\
\text{Level 3}: \quad & \delta_{00i} = \gamma_{000} + \gamma_{001}(\text{Group}_{i}) + \gamma_{002}(\text{Valence}_{i}) + \gamma_{003}(\text{Group}_{i})(\text{Valence}_{i}) + V_{00i} \\
& \delta_{10i} = \gamma_{100} + \gamma_{101}(\text{Group}_{i}) + \gamma_{102}(\text{Valence}_{i}) + \gamma_{103}(\text{Group}_{i})(\text{Valence}_{i}) + V_{10i} \\
& \delta_{20i} = \gamma_{200} + \gamma_{201}(\text{Group}_{i}) \\
& \delta_{30i} = \gamma_{300} + \gamma_{301}(\text{Group}_{i})
\end{aligned}
\tag{1}
$$

in which Intensity_{msi} is the observed intensity rating and e_{msi} is the model residual for memory m during session s for individual i. In Model 1, Period_{msi} represents earlier versus later (i.e. post-migration or adulthood) memories, Group_{i} represents Islanders versus Immigrants, Valence_{i} is the mean valence across memories for individual i, and Valence_{msi} is the individual deviation valence about each person's individual mean. Valence has been person-mean-centred in this fashion in order to separate between-person and within-person relations between intensity and valence, given initial analyses that suggested the magnitude of these effects differed significantly. A random intercept, a random slope for period, and their covariance were included at the person level (V_{00i} and V_{10i}, respectively) in order to represent individual differences in overall level of intensity and in the effect of period. A random intercept was also included at the session level (U_{0si}) in order to account for session-specific differences in intensity ratings within-persons. Separate variance components were estimated for each group as suggested by preliminary analyses. All variables were centred such that the intercept represented the expected intensity rating for an early memory of an islander with a mean valence rating of 3 (i.e. neutral valence).

Model 1 initially included four main effects: period (γ_{100}), group (γ_{001}), between-person valence (γ_{0002}) and within-person valence (γ_{200}); five two-way interactions: group by between-person valence (γ_{003}), group by within-person valence (γ_{201}), period by group (γ_{101}), period by between-person valence (γ_{102}) and period by within-person valence (γ_{300}); and two three-way interactions: group by period by between-person valence (γ_{103}), and group by period by within-person valence (γ_{301}). However, several effects were

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non-significant, including the two three-way interactions, the three two-way interactions with group, the period by within-person valence interaction, and the main effects of group and within-person valence, which were then removed in sequential models, and the remaining effects are shown in Table 2 and are described below.

In accord with Hypothesis 1, there was a significant main effect of period, such that memories for events that took place after immigration or in adulthood involved greater intensity than did memories for events that took place before immigration or in childhood ($b = 0.75$; evaluated at neutral valence). There was also significant random variation in the difference between periods across individuals, such that the 95% confidence interval for this effect across individuals was −1.53 to 0.03 for the islanders and −2.17 to 0.67 for the immigrants, indicating that not all individuals reported more intense memories during the later period (i.e. after immigration or in adulthood). There was also a significant main effect of between-person valence, such that persons who reported more positive memories also reported more intense memories ($b = 1.50$; evaluated for the period prior to immigration or during childhood). Finally, there was a significant two-way interaction of period and between-person valence ($b = -0.58$), such that as predicted by the fading affect bias, the tendency for later memories to be rated as more intense than earlier memories was magnified for negatively valenced memories.

Hypotheses 2 and 3: Valence between groups. Hypothesis 2 predicted that all participants will report memories from childhood and youth more positively than memories from adulthood and later life. Hypothesis 3 predicted that immigrants will report memories from childhood and youth (i.e. before immigration), more negatively than islanders will report memories from the same period. A preliminary analysis showed no significant effect of valence on age-of-memory before or after immigration, suggesting that differential event valence was not related to differences in age. Hypotheses 2 and 3

Table 2. Multilevel model parameter estimates for emotional intensity and valence

	Emotional intensity			Valence		
Parameter	Est	SE	*p*-value	Est	SE	*p*-value
Fixed effects						
Intercept ($\gamma 000$)	5.16	0.23	<0.001	3.63	0.11	<0.001
Childhood versus adulthood (period, $\gamma 100$)	0.75	0.14	<0.001	−0.62	0.13	<0.001
Between-person valence ($\gamma 002$)	1.50	0.46	0.002			
Between-person valence by period ($\gamma 102$)	−0.58	0.28	0.040			
Islanders versus immigrants (group, $\gamma 001$)				−0.32	0.17	0.061
Group by period interaction ($\gamma 101$)				0.42	0.19	0.027
Variance components for islanders						
Residual variance (σ^2_{Emsi})	3.95	0.21	<0.001	3.06	0.16	<0.001
Session intercept variance (τ^2_{U0si})	0.83	0.31	0.004	0.19	0.11	0.038
Person intercept variance (τ^2_{V00i})	1.38	0.65	0.016	0.03	0.08	0.383
Intercept, period covariance ($\tau_{\text{V00i, V10i}}$)	−0.53	0.32	0.093			
Person period variance (τ^2_{V10i})	0.15	0.22	0.242			
Variance components for immigrants						
Residual variance (σ^2_{Emsi})	2.26	0.11	<0.001	3.25	0.17	<0.001
Session intercept variance (τ^2_{U0si})	0.51	0.18	0.003	0.09	0.16	<0.0001
Person intercept variance (τ^2_{V00i})	1.68	0.62	0.003	0.07	0.07	0.179
Intercept, period covariance ($\tau_{\text{V00i, V10i}}$)	−0.80	0.33	0.016			
Person period variance (τ^2_{V10i})	0.50	0.24	0.019			

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were examined within Model 2:

$$\begin{aligned}
&\text{Level 1}: \quad \text{Valence}_{msi} = \beta_{0si} + \beta_{1si}(\text{Period}_{msi}) + e_{msi} \\
&\text{Level 2}: \quad \beta_{0si} = \delta_{00i} + U_{0si} \\
&\qquad\qquad\ \ \beta_{1si} = \delta_{10i} \\
&\text{Level 3}: \quad \delta_{00i} = \gamma_{000} + \gamma_{001}(\text{Group}_i) + V_{00i} \\
&\qquad\qquad\ \ \delta_{10i} = \gamma_{100} + \gamma_{101}(\text{Group}_i)
\end{aligned} \tag{2}$$

in which Valence_{msi} is the observed rating and e_{msi} is the model residual for memory m during session s for individual i, where higher values indicate more positive memories. In Model 2, Period_{msi} represents earlier versus later (i.e. post-migration or adulthood) memories and Group_i represents Islanders vs. Immigrants. Separate variance components were estimated for each group, but the random effect of period was not significant and was thus not included. Parameter estimates are given in Table 2.

In accord with Hypothesis 2, there was a significant main effect of period, such that memories for events that took place before immigration or in childhood were recalled as more positive than were memories for events that took place after immigration or in adulthood ($b = -0.62$, evaluated for islanders). There was a marginal main effect of group, such that the memories recalled by islanders were more positive than the memories recalled by immigrants ($b = -0.32$, evaluated for the early period). Finally, in accord with Hypothesis 3, there was a significant interaction between period and group, such that the difference between groups was significantly smaller (and non-significant) for later memories than for early memories ($b = 0.42$). That is, immigrants reported memories from childhood and youth more negatively than did islanders (Table 1).

Significance and rehearsal of memories

As noted above, participants also rated the significance of each memory and rated how often they believe they had talked about the event.

Hypothesis 4: Significance across groups. Hypothesis 4 predicted that immigrants will report events from the pre-migration period (childhood and youth) as having more significance than non-immigrants would report for events from that same period, and was investigated by estimating Model 2 for the significance outcome, as shown in Table 3. There was a significant main effect of period, such that memories that took place before immigration or in childhood were recalled as less significant than were memories that took place after immigration or in adulthood ($b = 0.42$, evaluated for islanders). There was a significant main effect of group, such that the memories recalled by Islanders were reported as more significant than the memories recalled by Immigrants ($b = -0.67$, evaluated for the early period). In contrast with Hypothesis 3, however, the group by period interaction was not significant ($b = 0.09$, $p > .05$).

Hypothesis 5: Rehearsal across groups. For exploratory purposes, we examined differences between groups on rates of rehearsal for memories of events from early and later life periods. These results are presented in Model 2 (Table 3). The effects of period, group and period by group were not significant, such that there were no differences in degree of rehearsal for memories of earlier versus later events, or between islanders and immigrants.

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Table 3. Multilevel model parameter estimates for memory significance and rehearsal

	Significance			Rehearsal		
Parameter	Est	SE	*p*-value	Est	SE	*p*-value
Fixed effects						
Intercept (γ000)	3.09	0.20	<0.001	4.81	0.35	<0.001
Childhood versus adulthood (period, γ100)	0.42	0.19	0.028	0.20	0.14	0.156
Islanders versus immigrants (Group, γ001)	−0.67	0.25	0.008	−0.63	0.42	0.143
Group by period interaction (γ101)	0.09	0.26	0.745	0.09	0.22	0.669
Variance components for islanders						
Residual variance (σ^2_{Emsi})	5.76	0.30	<0.001	4.41	0.23	<0.001
Session intercept variance (τ^2_{U0si})	0.12	0.10	0.109	0.39	0.19	0.022
Person intercept variance[a] (τ^2_{V00i})				0.81	0.34	0.009
Variance components for immigrants						
Residual variance (σ^2_{Emsi})	6.80	0.34	<0.001	3.55	0.18	<0.001
Session intercept variance (τ^2_{U0si})	0.41	0.24	0.040	0.70	0.26	0.004
Person intercept variance (τ^2_{V00i})	0.39	0.25	0.063	2.52	0.85	0.179

[a]Variance was estimated as 0.

DISCUSSION

In the present study, we tested the predictions of three kinds of revisionism on remembered emotion among older immigrants: (a) the fading affect bias, (b) the positivity bias, and (c) the tendency to recast the past in light of the present.

First, examining the remembered *intensity* of emotion, we predicted that both immigrants and islanders would remember later versus earlier events with greater emotional intensity, and also, in accord with the fading affect bias, we predicted that this effect would be magnified for negatively versus positively valenced emotions. Both parts of this prediction were confirmed.

Relative to the general prediction that remembered emotional intensity would fade over time, we found that when memories from childhood and youth were compared with memories from adulthood and old age, the latter were rated more emotionally intense at reinstatement than the former. Interestingly, the multilevel model showed some individual differences in these effects. For instance, there was significant random variation in remembered intensity between periods across individuals. That is, some individuals did not experience later memories as more emotionally intense relative to earlier memories, rather the result is seen in the aggregate. In addition, a main effect of between-person valence showed that people who reported more positive memories also reported more intense memories. These findings may be situated in prior research on emotional intensity as an individual differences variable (for review, see Larsen & Diener, 1987; Schimmack & Diener, 1997). This is the notion that the average levels of the intensity of emotional experience differ systematically across individuals. However, the finding that people who recall more positive memories also recall more intense memories is not consistent with that literature and requires additional investigation.

Relative to the specific prediction of the fading affect bias, our results confirm that remembered negative affect fades faster over time than remembered positive affect. That is, negatively valenced events from the period of childhood and youth were rated as less intense than positively valenced events from that same period, whereas positive and

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negative events were rated as having similar intensity levels in adulthood. We did not find individual differences in the fading affect bias, though it is interesting to note that such differences have been found in specific populations (e.g. dysphorics vs. non-dysphorics; Walker et al., 2003).

Second, examining the remembered *valence* of emotion, we found that remote memories were recalled more positively than more recent memories. This is predicted by the positivity bias, whereby positive memories are preferred to negative ones. Interestingly, this finding differs from previous research using the cue-word technique (Jansari & Parkin, 1996; Rubin & Schulkind, 1997). Differences in methodology may account for this difference. In our study, participants were asked to name specific emotions, and these were subsequently coded for valence, whereas in the studies mentioned, participants made pleasantness ratings of each memory as a whole but did not name emotions. The participant focus on discrete emotions, or the *post hoc* coding (or both) may have subtle effects on the range of valence reported.

Third, we compared the remembered *valence of immigrants' childhood and youth* versus the remembered valence of non-immigrants' childhood and youth. In accord with our prediction, the analysis shows that immigrants in fact recalled this period of time as more negative than did islanders. This is predictable from the likely character of the actual past (and/or immigrants' perception of that past at the time). As noted at the beginning of this paper, there is little doubt that a shared set of bleak circumstances motivated thousands of Puerto Ricans to leave the island (Padilla, 1987). We might expect that those who chose to leave the island would perceive these events as more personally significant than those who chose to stay, since arguably the events of this time period played a major role in their choosing to emigrate. Interestingly, however, immigrants do not judge these pre-migration events as more significant than non-immigrants (at least not now in the present), and we conclude that significance does not play a role in the revisionism observed here. Unexpectedly, however, islanders' significance ratings (across both periods) were generally higher than immigrants. This is an anomalous *post hoc* finding that merits attention in future studies.

Immigrant memory for a more negative past (vs. non-immigrants) is also predictable from theories that emphasize reconstructive bias in favour of the current situation. That is, given the freedom to move back to the island, the Puerto Ricans in this study have chosen to remain on the mainland over a 40–50 years period. The acculturation measures show that they have adjusted to and assimilated many of the values of US society, and their income levels are higher than those of their counterparts on the island. Further, frequent visits to the island have made them aware of these differences. Finally, as they have had children and grandchildren in the US, the likelihood of their returning to the island decreases, and this in turn provides further motivation for affirming the choices made by the current self. In these circumstances, they may well compare (more negatively) a past that they did not choose with a present that they ostensibly did choose. This interpretation also depends on immigrant's *perceiving* that they are better off than they would have been had they not left the island, and our data collection did not involve assessing this perception. Hence, future studies will need to assess both the current perceptions of immigrants about their situation as well as their acculturative and economic realities to draw stronger conclusions about this kind of memory revisionism.

For methodological reasons, these analyses focused on the Immigrants' memories cued in Spanish, excluding those cued in English, in order to provide an equitable comparison with Islanders' memories cued (necessarily) in Spanish. That is, although Immigrants also

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produced memories cued in English, these were excluded from consideration because Islanders could not participate in a comparable condition. This analytic strategy is consistent with research on bilingual autobiographical memory that shows that memories are preferentially retrieved in the language in which they were encoded (Marian & Neisser, 2000; Matsumoto & Stanny, 2006; Schrauf, 2000; Schrauf & Durazo-Arvizu, 2006; Schrauf & Rubin, 1998, 2000, 2004). That is, given the focus on immigrants' pre-migration memories from childhood and youth, cuing in Spanish should trigger more memories and more detailed memories than cuing in English (Schrauf, 2000). On the other hand, of course, there is the question whether immigrants' post-migration (adult) memories cued in Spanish are actually comparable with Islanders' memories for adulthood, since Immigrants would *also* have a fund of 'English' memories. Several factors suggest that this is not an issue. First, Spanish remained the principal language of Immigrants after migration. Thus, 24 of 25 Immigrants rated themselves as dominant in Spanish vs. English, and they lived in central city areas with high concentrations of other Spanish speakers. Second, a comparison of mean ratings of emotional intensity of post-immigration English memories ($M = 5.83$, $SD = 1.14$) with post-immigration Spanish memories ($M = 5.75$, $SD = 1.10$) shows no significant difference ($t(24) = 0.47$ n.s.). Similarly, a comparison of the valence of English ($M = 3.05$, $SD = 0.05$) vs. Spanish memories ($M = 3.06$, $SD = 0.67$) shows no significant difference ($t(24) = 0.08$ n.s.). Therefore, it seems unlikely that Immigrants are exercising a post-migration selection bias in recall.

In sum, we found that immigrants remember the pre-migration period of childhood and youth in a more negative light than non-immigrants, and we have adduced two factors that likely account for this: the fact that events were in fact bad, and reconstructive biases that favour (or even justify) the present over the past. Nevertheless, whether accurately remembered or recast in light of the present, the negativity of this pre-migration past does not override the positivity and fading affect biases completely because the results show a main effect of positive valence in earlier periods of life for both immigrants and non-immigrants alike. Further, although the difference between immigrant and non-immigrant memory for the pre-migration past is statistically significant, it is not substantively great, and we conclude that overall the effects of revisionism (of various sorts) are powerfully effective among these older immigrants. In effect, we suggest a complex interplay of revisionist tendencies that act in concert. That is, a series of negatively valenced events from a difficult period of time are subject to a reconstructive bias that highlights their negativity in memory, but these memories are also subject to the more general positivity and fading affect biases that serve to soften the negativity and accentuate positive valence. We cannot entirely disentangle these effects, however, and in future research we hope to refine methods that might do so.

Though such revisionism may seem to strike at the heart of memory veracity, it may also be a healthy response to the vagaries of life. This is consistent with the interpretation of the fading affect bias offered by Walker, Skowronski, and Thompson in their 2003 article, 'Life is Pleasant—and Memory Helps Keep It That Way!':

> 'Rather than viewing the fading affect bias as a retrospective error in memory, we argue that the fading affect bias represents evidence of healthy coping processes operating in memory . . . Such findings are consistent with what some researchers refer to as 'the psychological immune system', a system that helps to dampen the effects of negativity (e.g. (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998)' (Walker et al., 2003, p. 207).

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In this case, revision of remembered emotion would seem to diminish for the immigrant the intensity of feeling associated with a painful or sad pre-migration past.

CONCLUSION

In this study, we probed the power of revisionism on remembered emotion by testing for its effects among samples drawn from a population of Puerto Ricans that in fact experienced hard times during childhood and youth on the island. From this population, we recruited two samples: one sample of individuals who chose to leave the island, presumably because conditions for them were worse, or perceived as worse, than a second sample of individuals who chose to stay. We tested for the effects of revisionism on remembered emotion, and found that (a) for both groups, the intensity of remembered emotion diminished over time, and in accord with the fading affect bias, the remembered intensity of negative emotion faded more than positive emotion, (b) both groups shared a positivity bias, recalling childhood and youth more positively than adulthood and old age, and (c) immigrants recalled the emotional tone of childhood and youth more negatively than non-immigrants. We suggest that this last effect is probably best explained by two factors: immigrants' unrevised (more accurate) memory for a more negative past (which motivated immigration in the first place) *and* by additional revisionism whereby immigrants' compare their current, more favourable situation, to the past. The study sheds light on how different mechanisms of revision can have contradictory effects on remembered emotion among older adults, which suggests in turn that more complex research designs are needed to disentangle these effects.

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