

Negativity Bias, Negativity Dominance, and Contagion

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We hypothesize that there is a general bias, based on both innate predispositions and experience, in animals and humans, to give greater weight to negative entities (e.g., events, objects, personal traits). This is manifested in 4 ways: (a) negative potency (negative entities are stronger than the equivalent positive entities), (b) steeper negative gradients (the negativity of negative events grows more rapidly with approach to them in space or time than does the positivity of positive events, (c) negativity dominance (combinations of negative and positive entities yield evaluations that are more negative than the algebraic sum of individual subjective valences would predict), and (d) negative differentiation (negative entities are more varied, yield more complex conceptual representations, and engage a wider response repertoire). We review evidence for this taxonomy, with emphasis on negativity dominance, including literary, historical, religious, and cultural sources, as well as the psychological literatures on learning, attention, impression formation, contagion, moral judgment, development, and memory. We then consider a variety of theoretical accounts for negativity bias. We suggest that 1 feature of negative events that make them dominant is that negative entities are more contagious than positive entities.

Brief contact with a cockroach will usually render a delicious meal inedible. The inverse phenomenon—rendering a pile of cockroaches on a platter edible by contact with one's favorite food—is unheard of. More modestly, consider a dish of a food that you are inclined to dislike: lima beans, fish, or whatever. What could you touch to that food to make it desirable to eat—that is, what is the anticockroach? Nothing! And the cockroach is far from unique: there is a wide variety of animals (e.g., worms, caterpillars, slugs, spiders) that share the cockroach potency, along with a variety of microbially or toxin-contaminated objects. One of the best generic descriptions of this relative power of negative contamination is embedded in an age-old Russian adage: “A spoonful of tar can spoil a barrel of honey, but a spoonful of honey does nothing for a barrel of tar.” This apparent dominance of negative over positive contamination is played out on a vast human–social scale among the large traditional segment of 800,000,000 living Hindu Indians. People of higher castes are easily con-

taminated—that is, lowered in social status—by contact with members of lower castes. The contamination often occurs by eating food prepared by a lower caste. On the other hand, when people of lower castes consume foods prepared by higher castes, there is no corresponding elevation in their status. Stevenson (1954) summarized this feature of the caste system with the phrase “pollution always overcomes purity” (p. 50). The caste system pulls downward; it is easy to pollute and hard to purify.

Similarly, in many Western and non-Western religious traditions, becoming possessed by a malevolent demonic force is a relatively brief and easy affair (Oesterreich, 1974), whereas the reversal of the possession requires the painstaking, prolonged, and often injurious ritual of exorcism. On the other hand, in these same traditions, becoming “holy” or “saintly” usually involves a long moral trajectory of positive deeds, a state that can be compromised easily by one or a few immoral acts. The general principle that, for forgiveness to be achieved, the degree of acceptable expiation must dramatically exceed that of the initial fault, is dramatically played out in the Christian concept of redemption from original sin. In a number of traditions, there are some losses to one's purity, such as the sulling of female sexual honor through premarital sex or illicit affairs, which cannot be remedied at all.

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The dominance of negative contamination affords a particularly striking demonstration of what we take to be a very general principle, a principle that holds across a wide range of domains, and in nonhuman as well as human animals. The principle, which we call negativity bias, is that in most situations, negative events are more salient, potent, dominant in combinations, and generally efficacious than positive events. (There are exceptions to this claim, but they constitute a minority of cases and often involve special circumstances).

The principle of negativity bias has not escaped the attention of thinkers in many disciplines. The principle has been noted by a number of prominent humanists, including Shakespeare, Pushkin, and Schopenhauer (see quotes later in this article). Contemporary psychologists have pointed to forms of negativity bias in particular domains, and in general. These contributions will be discussed in more detail later, but to acknowledge our predecessors, we note here that, in a political science journal, Jordan (1965), summarizing results from different studies, concluded that “a positive attitude or positive affect does not have an effect on measured behavior oppositely equivalent to the effect of a negative attitude or negative affect” (p. 315). Kanouse and Hanson (1972) identified a negative bias effect with respect to a well-defined range of phenomena. Guido Peeters and his colleagues have produced many demonstrations of negative bias, particularly in the context of attitude and impression formation (Lewick, Czapinski, & Peeters, 1992; Peeters, 1971, 1989; Peeters & Czapinski, 1990).

Negativity bias has been the focus of attention in a few other lines of thought in psychology. The greater general potency of negative events is at the core of prospect theory, as described in the prospect function and labeled as *loss aversion* (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991). Taylor (1991) focused on the negative–positive asymmetry, in many of its manifestations, in the framework of demonstrating adaptive asymmetrical coping processes involved in neutralizing the greater negative potency. More recently, in a series of articles, John Cacioppo and his collaborators (Cacioppo & Bernston, 1994; Cacioppo, Gardner, & Bernston, 1997, 1999) noted a negativity bias effect in a number of domains, including three of the four that we document and organize in this article. Finally, independently of our work, and at the same time, a review of articles emphasizing negativity bias, particularly in the social interaction and impressions domain, has been completed (Baumeister, Bratslavsky, Finkenauer, & Vohs, in press).

Although negativity bias is often striking, it is far from universal. On the contrary, there is sufficient evidence for a positive bias that an entire book, *The Polyanna Principle* (Matlin & Stang, 1978), has amply

documented the wide range of positive biases. These appear in higher frequency of positive words, positive experiences, and positive views of the world, and in other domains. This puts us in the peculiar position of describing what we believe to be a basic tendency in the face of documented evidence for the opposite tendency, as well.

Guido Peeters and his colleagues (e.g., Lewick et al., 1992; Peeters, 1971, 1989; Peeters & Czapinski, 1990) directly addressed this apparent contradiction, which they described as positive–negative asymmetry. They treated the evidence for both positive and negative biases in a sophisticated and balanced way. They noted the interesting fact that, because negative events are much rarer than positive events, it is adaptive to assume the positive (the most likely occurrence) while being watchful for the dangerous negative. Thus, many examples of positive bias result from the same basic fact about the world, the dominance of positive experiences, as does negativity bias. Peeters and his colleagues have set the stage, appropriately, for a careful examination of the contexts in which each type of bias appears, and attempt to bring both phenomena under one conceptual umbrella. They have pinpointed the issue in noting the greater frequency, but lesser “urgency,” of positive events. Organisms must be most efficient at dealing with the most frequent occurrences, but also the most important occurrences. Cacioppo and his colleagues (Cacioppo & Bernston, 1994; Cacioppo, Gardner, & Bernston, 1997, 1999) also recognized positive and negative bias; they focused on a negativity bias as a more rapid recruitment of negativity than positivity with increasing strength of elicitors and a positivity offset defined in terms of a bias to treat relatively neutral entities as weakly positive.

Our contribution in this article to the prior work is fivefold.

1. We extend the range of domains in which negativity bias has been noted.
2. We present a taxonomy of negativity bias phenomena.
3. We clearly distinguish the special and, we believe, most robust and informative subclass of negativity bias phenomena: negativity dominance.
4. In particular, we highlight the previously unnoted area of contagion and contamination, which we believe is the most robust and informative subclass of negativity dominance. We argue that contagion and contamination matters both as a domain in which negativity bias makes some of its most dramatic appearances and a possible mechanism that mediates negativity bias effects in other spheres.
5. We review and extend, in light of the first four points, the significance, extent, and theoretical ac-

counts of the various negativity bias phenomena and attempt to include many of the phenomena of positive bias under the same theoretical accounts.

We regard our work as being largely complementary to the simultaneous work of Baumeister et al. (in press). The two articles differ both in respect to the structure of their arguments and the range of examples they proffer in support of the general proposition that negativity bias is a pervasive and consequential feature of human existence. However, the main difference between our works lies elsewhere. Baumeister et al. analyzed the phenomenon at hand primarily in terms of independent, orthogonal influences of bad and good things on behavior and cognition. Our work, on the other hand, emphasizes the tendency of the effects of the negative to dominate (or even utterly overwhelm) those of the positive when the two are blocked together to form a single configuration. This echoes the Gestalt-like claim that, in a wide range of cases, the "cognitive interaction" of two stimuli, such as those denoting evaluatively positive or negative personal attributes and brought together to form a novel composite, cannot be accurately anticipated from prior knowledge of the values of the two stimuli taken apart (Rokeach & Rothman, 1965; Royzman, 2000).

Four Aspects of Negativity Bias

In this taxonomic section we propose three or four types of negativity bias: *negative potency*, *greater steepness of negative gradients*, *negativity dominance*, and *negative differentiation*.

Negative Potency

The principle of negative potency asserts that, given inverse negative and positive events of equal objective magnitude, the negative event is subjectively more potent and of higher salience than its positive counterpart. More generally, the claim is that negative events are more potent with respect to their objective magnitude than are positive events. This is described in the prospect function and is at the core of the loss aversion phenomenon (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991). For example, in the domain of politics, Bloom and Price (1975) showed that short-term economic conditions, when they are downturns, reduce the vote for the party of the incumbent in American presidential elections, whereas upturns have virtually no effect. The endowment effect is perhaps the purest and most robust instantiation of loss aversion (Kahneman, Knetsch, & Thaler, 1990); people will demand much more to give up something they possess (a loss) than they will pay to obtain the same item (a gain).

Loss aversion has been demonstrated in a number of domains, but it does not always occur. The demonstration of negative potency is unfortunately limited, because it requires a metric (usually money) to establish the objective equality of negative and positive events (e.g., losing and gaining \$100, or 10 lb of weight, or 5° in temperature), or comparison of two contexts for the same material entity (as in the case of the endowment effect).

Greater Steepness of Negative Gradients

There is minimal but provocative evidence that negative events grow more rapidly in negativity as they are approached in space or time than do positive events. There have been only a few empirical attempts to demonstrate this, but we consider this principle potentially important. The clearest demonstrations and discussions of this phenomenon appear in the animal learning literature (Brown, 1948; N. E. Miller, 1944; discussed later). Recently, Cacioppo and colleagues (Cacioppo & Bernston, 1994; Cacioppo, Gardner, & Bernston, 1997, 1999) discussed this asymmetry and incorporated it into their computational model of evaluative space. In particular, they posited steeper negative gradients (which they described as negativity bias) along with a tendency for a net positive outcome with very weak negative and positive inputs (which they described as positivity offset). In addition to the work of Brown and Miller, they cited evidence from the impressions literature, suggesting that negative events dominate positive events only when both are strong.

It is possible that steeper negative gradients are simply a manifestation of negative potency because the steeper gradient follows from the fact that additional negative units (measured as stimuli) will produce larger psychological effects than additional positive units. However, in light of the phenomenon of positivity offset, the gradient effect may be distinct from negative potency because at low levels negative inputs do not seem to be more potent than "equivalent" positive inputs. Negative potency might result from higher subjective levels of negative stimuli at all stimulus levels, so that the two functions might have the same slope but the negative function might have a higher intercept. However, the gradient results suggest that this is not the case; rather, the negative functions seem to have a lower intercept but a higher slope.

Negativity Dominance

According to the principle of negativity dominance, the holistic perception and appraisal of integrated negative and positive events (or objects, individuals,

hedonic episodes, personality traits, etc.) is more negative than the algebraic sum of the subjective values of those individual entities. The entities being summed algebraically are not stimuli, but evaluations; hence, negativity dominance occurs after we take into any possible effect of negative potency and is, in principle, independent of it. Negativity dominance does not require, operationally, the use of objectively equated or objectively measured stimuli. We consider negativity dominance the most robust and most common exemplification of negativity bias, and this article focuses primarily on this principle. All of the examples offered at the beginning of this article illustrate negativity dominance. In the purest condition, negativity dominance holds that the combination of events of equal but opposite subjective valence will be negative. Thus, if losing \$100 is worse than winning \$100 is good, we have an instance of potency. But if we then find that losing \$100 is as bad as winning \$150 is good, and that losing \$100 and winning \$150 is negative, then we have negativity dominance.

Kanouse and Hanson (1972) recognized the particular importance of negativity dominance. They framed the power of negative properties in terms of their ability to interfere with enjoyment of positive aspects, as when a rancid taste completely ruins the good taste of a soup. They suggested that "negative components of a complex object are overweighted only when the good and the bad are found together in one object, when they are inseparable" (p. 58). Moreover, as one of us noted elsewhere (Rozyman, 2000), it is precisely when negative and positive stimuli are "blended together" to form a novel gestalt that one sees one of the most remarkable manifestations of the dominance principle—"negative overassimilation," in which a property that is evaluated negatively in its own right "may be judged even more negatively when ... lodged in a positive subject" (Rokeach & Rothman, 1965, p.130), so that "irresponsible father" could be judged more negatively than "irresponsible" (Rokeach & Rothman, 1965) and "loyal martinet" more negatively than "martinet" per se.

We find it useful to draw a further distinction between the *synchronic* (simultaneous) and the *diachronic* (successive) manifestations of negativity dominance. The former concerns the appraisal of negative and positive components as co-occurring constituents of a single whole (as in the case of forming a holistic impression of a person on the basis of a list of adjectives that describe that person's negative and positive traits). Under these conditions, the negative component would be disproportionately more influential in determining the overall appraisal than the positive components of comparable magnitude. The diachronic subtype, on the other hand, is revealed in the cancellation of positive by negative events, and vice versa (as in the case of determining how many lives a murderer

has to save to neutralize one act of murder). The cockroach and the purification rites examples cited at the beginning of this article embody distinctly the diachronic subtype of negativity dominance.

We believe that instances of negativity dominance afford us more dramatic and effectual means of showing that the core of the positive-negative asymmetry in both physical and moral domains may be the fact that the corrupting or "devaluing" power of bad things is greater than the redeeming power of good things (Rozyman & Kumar, 2001). The image that comes to mind from the physical domain is that of a single cancerous growth or germ that radiates itself through and ultimately consumes a perfectly healthy body. The image that comes to mind from the moral domain is that of a single vice corrupting and perverting and bringing the moral downfall of an otherwise perfectly good person.

Greater Negative Differentiation

Negativity bias manifests itself in the fact that negative stimuli are generally construed as more elaborate and differentiated than the corresponding positive stimuli. This phenomenon of greater negative differentiation represents, in our view, yet another facet of the general negativity bias principle. The most reliable finding consistent with this phenomenon is that the vocabulary used to describe the qualities of evaluatively negative phenomena is far richer and more varied than that employed to depict those associated with evaluatively positive stimuli (Peeters, 1971), suggesting that our cognition is perhaps more complex, elaborated, and fine-tuned when it comes to the occurrences of the former (e.g., Czapinski, 1985). Negative differentiation is distinguished by Peeters and his colleagues from the other negativity bias effects under the term *informational negativity effect*, in contrast to the *affective negativity effect*, which includes what we call potency and dominance. Another example of greater negative differentiation, described later, is the generally greater number of negative than positive emotions.

A Possible Additional Aspect of Negativity Bias: Less Adaptation to Negative Events

There are suggestions in the literature, from studies of pain and stress (see, e.g., Taylor, 1991) and adjustment to major good and bad life-events (Brickman, Coates, & Janoff-Bulman, 1978), that there is less adaptation to negative than positive situations. We will not consider this possibility further for two reasons: (a) there is not much evidence to support this claim; and (b)

even if there was evidence, it would be subject to the interpretation that it was a byproduct of negative potency. Careful matching of negative and positive inputs would have to be carried out to establish less adaptation to negative events as independent of negative potency.

A Note on Method

The logic of argument for negativity bias is complex, largely because of the difficulty of equating negative and positive events. At one level, one can compare subjective reactions to objectively equal negative and positive events; this depends on some sort of acceptable scale for events, such as money (losing vs. winning \$100) or temperature. A second approach is to compare combinations of stimuli equated for subjective intensity, or more generally, showing that the outcome evaluation of combined stimuli is more negative than an algebraic sum of subjective (or objective) intensities. A third possibility, depending on the claim, is to show an interaction effect, such that, for example, mixed negative and positive stimuli become more negative the closer one is to them. A fourth way of making a meaningful comparison is to show that a negative event pushes some output into negativity, but a positive event that corresponds in some way to it has no effect in the positive direction. This avoids the scaling problem. A fifth strategy is to show that there is no exact positive equivalent of a given negative construct. For example, Baumeister et al. (in press) argued that there is no apparent positive equivalent to the event of psychic trauma and the associated condition of Post Traumatic Stress Disorder. A sixth approach is to show that, given two logically related but oppositely valenced constructs (e.g., pessimism vs. optimism, bad parenting vs. good parenting), it is the absence or presence of the negative construct that is the principal determinant of an outcome of interest (e.g., recovery), with the positive counterpart making little or no marginal contribution. An example of this strategy at work is afforded by a recent study by Schulz, Bookwala, Knapp, Scheier, and Williamson (1996). Drawing on the prior research, indicating that pessimism and optimism are better viewed as separate factors rather than bipolar opposites, these authors examined separately the effects of dispositional pessimism and dispositional optimism (assessed as responses to four negatively phrased and four positively phrased subscales of Scheier & Carver's, 1985, Life Orientation Test) on survival among 238 patients with advanced cancer. Pessimism was a significant inverse predictor of survival at the 8th month's follow-up for the younger age group (30–59). On the other hand, optimism was not a significant predictor of survival at any age. Baumeister et al., who also cited this and re-

lated evidence, made excellent use of this strategy in their article, illustrating extensively how the absence of the negative matters more than the presence of the positive across a variety of domains, including health, parenting, and relationships. Seventh, less logically sound but often convincing, are findings of a large disparity in effect between a negative and a positive event, as when there is obviously nothing to match the potency on the positive side of a cockroach touching food. All seven of these lines of evidence can be supported by experiments, careful observations, and/or anecdotal reports.

Evidence for Negative Bias in Different Domains

This article is organized in terms of the domains in which negativity bias may occur: sensory, memory, contamination, impressions of persons, moral judgments, and so forth. Superimposed on these domains is our organization of the ways in which negativity bias is manifested. This taxonomy can be fit within the Peeters affective and informational distinction. Some of the areas that we review have received thorough recent reviews, in the context of a negative bias, particularly by Peeters and his colleagues (Lewick, Czapinski, & Peeters, 1992; Peeters, 1971, 1989; Peeters & Czapinski, 1990), Taylor (1991), Cacioppo and his colleagues (Cacioppo & Bernston, 1994; Cacioppo, Gardner, & Bernston, 1997, 1999), and Baumeister and his colleagues (Baumeister et al., in press). In those domains, our review will be less thorough and will cite principally the conclusion of prior reviews.

Physiological Arousal

Taylor (1991) recently reviewed this literature and concluded that there is generally more physiological arousal to negative events and that arousal alone is generally interpreted negatively. She also pointed out that negative stressors (changes) seem to have more of an effect on health than "equivalent" positive "stressors." As she admitted, the evidence on all of these points is not convincing, because there have been few direct comparisons, and because it is difficult to equate positive and negative events for purposes of comparison. All of the evidence on physiological arousal is directed at the demonstration of negative potency (as opposed to negativity dominance, which involves combinations of negative and positive events). However, Cacioppo et al. (1999) reviewed evidence from evoked potentials in humans suggesting disproportionately negative outputs from combinations of negative and positive inputs (negativity dominance).

Sensation and Perception

As Schopenhauer (1844/1995) noted more than 100 years ago, the absence of pain, unlike pain, has no distinct phenomenological presence:

We feel pain, but not painlessness. ... We feel the desire as we feel hunger and thirst; but as soon as it has been satisfied, it is like the mouthful of food which has been taken, and which ceases to exist for our feelings the moment it is swallowed. (p. 575)

Schopenhauer's (1844/1995) claim is correct for the body interior. With the exception of positive sensations arising in muscles (as in massage), the inside of the body is basically a source of evaluatively negative input. No news is good news, from the point of view of the body interior. The sensations that arise from the body interior are essentially painful indications that all is not well (Rozin, 1999; Troland, 1928). Thus, from the inside point of view, the "positive" state of normal function is the essentially neutral default. Not only does one not go to the doctor when ones' organs feel good, but one does not even notice it.

However, the body surface, and especially its apertures, represent both pleasure and pain (Rozin, 1999; Troland, 1928). But even on the body surface, there is a wider distribution of pain. Pain can be produced anywhere on the body surface, whereas the loci for pleasant sensations are far more circumscribed, even named for one set of pleasant sensations: the erogenous zones—there are no labels for "torturogenous zones."

The "we feel pain, but not painlessness" dictum finds its reformulation in Scitovsky's (1974) idea of the phenomenological paleness of comforts, goods that are dedicated to preserving a minimal level of painlessness and that, so to speak, keep pain at bay (e.g., air conditioners). Scitovsky pointed out that we gain little from comforts, because we adapt to them quickly (see also Frederick & Loewenstein, 1999). People generally don't get pleasure from their air conditioning, but would experience immediate discomfort if it ceased to operate.

Negative potency (higher psychological intensity of negative as opposed to positive events) in sensory systems is also exemplified and organized by Troland's (1928) analysis of sensory systems into nociceptive (indicating harm), beneceptive (indicating benefit), and neuroceptive (informational, but innately affectively neutral). The principal neuroceptive systems are vision and audition, but proprioception and pressure and touch are also included. In all of these systems, it is generally true that high levels of stimulation are aversive, but lower levels are often neutral. Troland suggested that the nociceptive and beneceptive systems are reporting on the state of the organism, whereas the neuroceptive systems are re-

porting on the state of the environment. Pain is the principal nociceptive system, but others include the sensations resulting from empty lungs, a full bladder, or certain types of gastrointestinal upset (producing nausea). In each of these cases, there is no obvious beneceptive input that results from normal function. Troland identified the erotic system as the basic positive system. Some systems have nociceptive and beneceptive components, such as taste and smell. In taste, there are more negative (bitter, sour) than positive (sweet) subsystems. Troland noted that decrease in rate of increase of activity in a nociceptive system, or more clearly, cessation of its activity, may lead to positive sensations. Examples he offered include the pleasure of release of discomfort from emptying the bladder or bowels, or from breathing following unpleasant symptoms resulting from oxygen deprivation from the lungs. Indeed, hunger and thirst can be thought of as nociceptive systems; the reduction of either surely produces positive affect, but the systems are basically negative: we only appreciate satiation as a positive sensation at the time that it directly follows a period of hunger or thirst.

The response to stimuli leading to negative evaluations are generally more distinct and intense than those leading to positive evaluations. This is clear in comparing negative and positive facial expressions to tastants in both humans (Steiner, 1979) and rats (Grill & Norgren, 1978).

Although there is substantial adaptation to continued stimulation in most sensory systems, the pain system stands as a notable exception. Pain, as an indicator of something awry, remains an attention-getting input. Furthermore, there is evidence that people adapt more to fragrant than pungent smells (Cometto-Muniz & Cain, 1992).

Attention and Salience

Generally, negative information seems to command more attention. The intellectual issue raised by this small literature is the extent to which negative bias in salience is completely a byproduct of negative potency (greater psychological impact of negative events than equivalent positive events), or whether there are some special negative bias features that operate particularly in the domain of attention. The last study we review (Pratto & John, 1991) controls for potency and still reveals a negative bias effect. The small number of articles that address negative bias in attention focus on the greater ease of identifying negative stimuli, the higher speed of locating negative stimuli in a search task, or the greater masking power of negative stimuli. The stimuli involved are faces, words, and social information.

Masking. Ohnesorg (1999) demonstrated that negative words are more effective as backward masks than positive words. The results also suggested that on repetition as masks, the attention capturing capacity drops faster for positive as opposed to negative words.

Identification. Steiner (1979) studied the judgments by adults of the emotions expressed by infants, presented on videotape, while the infant was experiencing negative (sour or bitter) and positive (sweet) tastes. He reported that adults are better at judging the negative faces. Of course, this suggestive study does not distinguish between the salience of the expressions in the infants or the recognition ability of the participants. Similarly, and with the same proviso, H. J. Grill (personal communication, 1990) reported a greater sense of "urgency" in the Norway rat's response to negative taste as opposed to positive taste stimuli.

Search. There is one thorough and excellent study in this area, dealing with the search for negative or positive faces in a field (crowd) of other faces (Hansen & Hansen, 1988). The authors reported an "anger superiority effect." The task is to scan a "crowd" of black-and-white faces of the same person and identify the one face that is discrepant from the others. The discrepant face can be happy or angry, in a background of neutral or opposite valence (angry or happy, respectively) faces. Reaction times are much faster for angry than for happy face targets. Further analysis demonstrates the striking fact that identification of anger faces occurs at about the same time for crowds of four or nine faces, whereas the search for a happy face takes longer with the larger crowd. These results suggest that there is a parallel search for the angry face, a "pop-out" effect, but not for the happy face. The authors proposed that there is a possible preattentive parallel search for signals of direct threat.

Pratto & John (1991) measured reaction times for naming the colors of words in a Stroop test and found that times were longer for undesirable than desirable trait words, suggesting an attention-grabbing power for negative social information. This effect did not appear for negative versus positive nontrait words, occurred when the diagnostic base rate for the negative and positive trait words was controlled, and occurred when the trait words were balanced for extremity (eliminating a simple potency interpretation). The authors reasoned that if attention is selectively diverted by negative traits, then more should be learned about them in an incidental learning situation. On repeating the Stroop study, they found that there is greater free recall of the negative as opposed to positive words after the trial.

Learning

In the domain of learning, we have the opportunity to introduce findings from the animal as well as the human literature. The basic claim is the existence of negative potency and is that negative events, serving as reinforcers, produce learning that is more rapid and more resistant to extinction than learning based on comparable positive reinforcers. The latter claim, about resistance to extinction, has not been tested, to our knowledge. These predictions amount to the claim that learning about negative USs is "prepared," in the sense defined by Seligman (1970). A third claim is that it should be easier to reverse innate preferences than innate aversions. This entire analysis is subject to the problems raised about comparing negative and positive in the previous section on methodological issues. The problem is particularly strong in this domain because much of the data come from animal research, where there is no accepted way to equate subjective intensity.

Students of animal learning are generally aware that learning with negative events (e.g., escape in the operant framework) is more rapid than learning with positive reinforcers. Perhaps the most striking case is traumatic avoidance learning, which occurs in a single trial, motivated by a single strong electric shock (Solomon & Wynne, 1954). It seems to be generally true, although there is no rigorous test nor systematic comparison in the literature, that escape and punishment are more effective in producing acquisition and resistance to extinction than their positive equivalents, and negative contrast effects may be stronger, on average, than positive contrast effects.

Taste aversions in animals. Conditioned taste aversions, in both animals (reviewed in Garcia, Hankins, & Rusiniak, 1974; Rozin & Kalat, 1971) and humans (Garb & Stunkard, 1974; Logue, Ophir, & Strauss, 1981), typically occur in a single trial. Indeed, conditioned taste aversions are acquired so rapidly, and with such a robust effect, that it has been necessary to reduce the magnitude of the US (often by reducing the potency of the nausea producing procedure) to demonstrate a learning curve. Positive learning in the food domain rarely occurs with such rapidity; Sclafani & Nissenbaum (1988) demonstrated the most rapid learning, sometimes in a single trial, using a particular type of carbohydrate (polycose), and also fat reinforcers. However, overall, there is little doubt in the animal literature about the greater speed and robustness of conditioned taste aversions, as opposed to preferences. Zahorik (1979) attempted a direct comparison and confirmed this relation, although her study was not able to accomplish a convincing demonstration that the nega-

tive and positive reinforcers were equated, in some reasonable sense.

The negative bias hypothesis is strongly supported in studies that attempt to reverse innate preferences or aversions. The standard one-trial-effective taste aversion paradigm uses sugar or saccharine solutions, for which there is an innate preference. On the contrary, extended efforts to reverse innate aversions to bitter or irritant sensations in animals, over many trials and months, have generally failed almost completely (Rozin, Gruss, & Berk, 1979; Warren & Pfaffman, 1959). Exceptions are one study with rats using social mediation (conspecific consuming an irritant diet), which led to a modest preference for a mildly irritating diet (Galef, 1989); one study showing a very gradual development of a preference for piquant crackers by captive chimpanzees, in a situation of extended social interaction with humans (Rozin & Kennel, 1983); and one case of a dog that gradually developed a preference for piquant foods, in a social and home environment (Rozin & Kennel, 1983). Although humans regularly and gradually develop preferences for many innately unpalatable foods such as chili pepper, ginger, raw garlic, coffee, and alcohol, there are practically no cases on record of spontaneous development of such preferences in animals. To the contrary, animals that regularly consume spicy Mexican food (as garbage) in a rural Mexican setting do not develop a preference for chili pepper, whereas all the surrounding adults over the age of about 5 do (Rozin & Kennel, 1983; Rozin & Schiller, 1980).

Taste aversions, phobias, and fetishes or passions

in humans. The usually one-trial, robust, taste-aversion phenomenon has been well documented in humans, primarily by retrospective questionnaire (Garb & Stunkard, 1974; Logue et al., 1981; Pelchat & Rozin, 1982), and it appears that nausea is the critical unconditioned stimulus that produces the effect (Pelchat & Rozin, 1982). Conditioned taste aversions have also been produced in humans under controlled conditions (e.g., Bernstein, 1978).

Phobias represent yet another area in which there is strong, retrospective evidence for rapid one-trial negative learning. Single traumatic incidents with dogs and other animals, in particular, seem sufficient to produce strong negative responses (Solomon & Wynne, 1954). Seligman (1970, 1971) used conditioned taste aversions and phobias as prime examples of what he called "prepared" learning. However, there is no well-documented opposite effect of very rapid and robust positive learning in humans. Humans come to develop strong likes for many things, including foods, music, and pets. In all of these, so far as we know, the acquisition process is much slower than for taste aversions or

phobias. (However, there is no evidence that these strong likes are less resistant to extinction than are phobias or conditioned taste aversions.)

Humans may be unique, among animals, in the development of strong and enduring likes (Rozin, 1982). These are abundant and include the robust reversal of innate aversions, as in the development of strong preferences for chili pepper, coffee, horror movies, tragic drama, and scary rides at amusement parks (McCauley, 1998; Rozin, 1990). It is possible that this perhaps unique human feature is an adaptation to culture, which requires adherence to, and preferably a desire for, a whole set of cultural values (Rozin, 1982). However, whatever the reason for this, these strong positive attachments develop gradually.

The opposite of a taste aversion or a phobia would be what we call a fetish, or more generally, a passion. Passions exist on a grand scale in humans, especially in the first world, where there is leisure time that would allow for such activities. Passions, which we will define as strong liking for things or activities that have no obvious biological function, become a major part of one's life and a major source of pleasure. Passions include activities such as collecting stamps or bottle or hub caps, horse or automobile racing, and sports fandom (Wrzesniewski, Rozin, & Bennett, in press). These passions challenge any straightforward adaptive account and are, in a sense, a challenge as well to the principle of negativity bias. Although there has been no experimental research in this area (except for sexual fetishes, see Rachman & Hodgson, 1968), there is no reason to believe that passions are rapidly acquired, although they often are highly resistant to extinction.

Evaluative conditioning. Other than mere exposure, evaluative conditioning is the only account for the acquisition of likes and dislikes with both a theoretical basis and abundant supporting laboratory experiments. In evaluative conditioning in humans, a positive or negative US (e.g., an unpleasant or pleasant picture, face, or taste) is contingently paired with a relatively neutral CS. After a number of trials, the participant's evaluation of the CS moves in the direction of the US (Martin & Levey, 1978). The initial investigators of this type of conditioning, Levey and Martin (1975), concluded that "The effect of negative evaluation was clearly stronger than that for positive evaluation, and this is consistent with our knowledge of aversive conditioning" (p. 224). Subsequent studies of evaluative conditioning, most prominently by a group of Belgian investigators led by Frank Baeyens (e.g., Baeyens, Crombez, Van den Bergh, & Eelen, 1988), are consistent with this result, although no direct tests of the negative bias hypothesis have been made. The Baeyens group initially used positive and negative faces as unconditioned stimuli,

roughly balanced for valence by subject ratings. The results supported slightly larger conditioned effects for the negative stimuli. More recently, the Baeyens group has shifted to a different paradigm, based on pairing of flavors with pleasant or unpleasant tastes (Baeyens, Eelen, Van den Bergh, & Crombez, 1990). This paradigm was based on a positive finding for pairing of sweet tastes with neutral flavors (Zellner, Rozin, Aron, & Kulish, 1983). However, the Baeyens group found the positive pairing to produce only marginal effects, whereas pairing with a negative taste produced more robust effects (Baeyens et al., 1990).

Both conditioned taste aversions and acquired phobia fit within the paradigm of evaluative conditioning. Both, as previously mentioned, show a substantial negativity bias.

Motivation—Gradient Steepness

This minimally investigated area provides the only direct evidence for one of the four manifestations of negativity bias, the steeper approach gradients for negative as opposed to positive stimuli. The basic finding is that as one approaches a negative entity, in either time or space, the aversion for that entity or experience increases more steeply than the increase in attraction does for approach to a positive entity (N. E. Miller, 1944). Note that this relation does not depend as much on careful balancing of the negative and positive entities as do the potency studies because the finding of interest is an interaction effect.

The evidence for this potentially basic feature of animal and human motivation is summarized by N. E. Miller (1944). The most convincing study was carried out by Brown (1948). Brown measured the rat's tendency to pull toward a reward (food) at the end of an alley, at different points in the alley; he did the same for the tendency to pull away from a negative event (shock) at different points in the alley. He reported steeper negative than positive gradients in terms of distance from site of feeding or shock. This was confirmed at two different levels of motivation (amount of food deprivation or intensity of shock). In Brown's design, temporal and spatial closeness are confounded. Although it is likely that the gradient phenomenon holds for time or space alone, this has not yet been demonstrated.

Another type of demonstration of the gradient effect would be to show that for events (or roughly simultaneous combinations of events) of mixed positive and negative characteristics, the net response to these events becomes more negative the closer one is to them (in space or time). We have recently (Rozin, Kurzer, & Royzman, 2000) demonstrated this with human participants, who rated their net evaluative response to a neg-

ative and positive event scheduled to occur on the same day, from the vantage point of 1 month ahead versus tomorrow. For tomorrow, the event combination was rated as more negative.

N. E. Miller (1944) offered an account of the steeper negative gradient in terms of the source of motivation. He pointed out that electric shock is an external event, such that closeness to its source should reasonably increase intensity of response. For food, however, there is an underlying motivation of hunger, which presumably does not vary much as one approaches the goal object. In other words, insofar as negative motivations are more externalized, closeness should be a more powerful dimension in the negative case. Miller also noted that the gradient steepness is separable from the gradient height and referred to studies (including the work of Brown) that indicated that overall strength of motivation affects the height but not the slope of the gradient function.

In addition to N. E. Miller's (1944) external versus internal motivation account, there are two possible, not mutually exclusive, accounts of gradient effects. According to the intensity account, some aspect of the preevaluative representation of the relevant stimuli shows a negative enhancement effect. There is at best suggestive evidence from taste that intensity of bitter (measured by physiological response) rises more steeply than for sweet (Pfaffman, 1960), and it seems to us quite reasonable that this would also hold true for pain or pleasure from the body surface. Because we can presume that getting closer in time or space to a stimulus increases the intensity of its representation, this intensity negative bias effect could account for gradient effects. However, one could also argue that, given the urgency of negative inputs, the input might rise to a maximum very rapidly, so that gradient effects might only occur over a small range of time or space. There are suggestions of a steeper function relating negative entities to affective negativity in the contagion literature. The phenomenon of dose insensitivity, documented principally for negative contagion, indicates that very small doses of contact with negative entities (e.g., germs, contact with an undesirable other person) produce almost the maximal effect (e.g., Rozin & Nemerooff, 1990; Rozin, Markwith, & Nemerooff, 1992).

The negative gradient effect might also result from an asymmetry later in the processing system. In the face of equal recruitment of intensity with closeness, it is possible that the function relating subjective intensity to evaluation is what is more steep for negative than for positive stimuli. We know of no direct evidence on this relation. In either event, it is important to realize, as Cacioppo and his colleagues have indicated (Cacioppo & Bernston, 1994; Cacioppo, Gardner, & Bernston, 1997, 1999), that although the slope is steeper for negative events, at low levels, the absolute

value of positive affect is higher than is negative affect (“positivity offset”).

Mood

Taylor (1991), on reviewing asymmetrical effects of negative and positive events, concluded that expectations of negative events are the strongest determinants of mood. Insofar as negative events have been equated with positive events, she suggested that negative effects still have a bigger effect on mood.

Memory

For fine ideas vanish fast, While all the gross and filthy last. (W. I. Miller, 1997, p. 70 [Strephon and Chloe vv 233–234, Poetical Works, 525])

The evil that men do lives after them; the good is oft interr'd with their bones. (Shakespeare, quoted in Greenblatt, 1997, p. 1565)

These quotes notwithstanding, the existence of a negativity bias (negative potency) in memory is controversial. Baumeister et al. (in press), in their review of the memory literature, concluded in favor of the existence of a negative bias in memory, at least for certain types of information. On the other hand, Taylor (1991) and Matlin and Stang (1978) argued for greater potency of positive memories. Our own consideration of the literature inclines us to support a positivity bias view in memory.

The widespread operation of negativity bias might be expected to generalize to selective memory for negative experiences. This prediction might be strengthened by the greater attentional salience of negative events (reviewed earlier) and abundant evidence for deeper processing of negative events (reviewed in Baumeister et al., in press). Although there are some striking examples of predominance of negative bias in recall, notably of early childhood memories (Blonskii, 1935/1994; Kreitler & Kreitler, 1968), in our view the preponderance of evidence suggests a positivity bias in this domain. The most thorough treatment is in a chapter reviewing this very issue in a book devoted to demonstrating a general positivity bias (Polyanna Principle) by Matlin and Stang (1978). Well over 100 findings, from various paradigms, show a positivity bias in a majority of cases. Matlin and Stang considered three accounts for this: advantages in short-term memory, selective rehearsal, or compensatory processes in long-term memory, and find evidence for each. Most impressive is their multiple regression analysis of 14 variables on degree of positivity bias. A

major effect is reported for delay of recall, such that longer delays lead to more positive bias. Taylor (1991), in a review, came to a similar conclusion as Matlin and Stang and focused her account on compensatory responses that minimize negative memories, which occur gradually over time (accounting for the increased positivity bias with delay). Thus, on Taylor's reasonable view (consistent with Matlin and Stang), the major reason for positivity bias is not that negative events are inherently less memorable, but rather that they are neutralized over time.

Results on both autobiographical memory and laboratory studies suggest that over modest to long intervals of recall, there is a positivity bias in memory. The question remains as to whether this bias directly contradicts the principle of negativity bias. There are two processes that may be at work in these studies to enhance the appearance of a positivity bias. There is abundant evidence that positive events are much more frequent than negative events; hence, in an autobiographical recall study, one would expect more positive events. This is a substantial bias, but it has been eliminated as a total account by a number of studies in which participant's recall was checked against diary records of positive and negative experiences that they were asked to keep (Holmes, 1970; reviewed in Matlin & Stang, 1978).

The second “bias” in recall is the very compensatory processes that are aptly described by Taylor (1991). Work is done to reduce the salience of negative events in memory. We are inclined to believe that Taylor identified the major reason for a positivity bias in recall and that the mechanisms she invokes themselves testify to the salience of negative events.

Contagion

The domain of contagion offers what are perhaps the most striking instances of negativity bias. It is partly for this reason that the striking examples we introduced at the beginning of this article are about contamination. The negativity bias in contagion is evidenced in the terminology alone: Negative contagion is represented in the word “contamination” in English. There is no obvious opposite term for positive contamination (purified has a much more general meaning and does not imply minimal contact, as does contamination).

The law of contagion was put forward as one of the laws of sympathetic magic by three anthropologists around the turn of the century (Frazer, 1890/1922; Mauss, 1902/1972; Tylor, 1871/1974). The basic idea is that when entities contact, “essence” passes between them and leaves a permanent trace (“once in contact, always in contact”; reviewed in Rozin & Nemerooff, 1990; Nemerooff & Rozin, 2000). Minimal contact is all

that is necessary to allow for the passage of essence. The early anthropologists saw contagion as a belief of “primitive” peoples, but it is now clear that it is universal (Rozin, Millman, & Nemeroff, 1986). Common examples for Americans include reluctance to consume foods briefly contacted by worms or cockroaches or to wear clothing that had previously been worn by a disliked person.

Negativity bias in the potency domain is intuitively clear for Americans and has been demonstrated in the laboratory (Rozin et al., 1986; Rozin, Nemeroff, Wane, & Sherrod, 1989). In particular, disliked people produce a larger contagion effect than do liked people. In addition, as indicated in the introduction, in the food domain, there is nothing nearly as potent on the positive side as a cockroach or an earthworm on the negative side.

Negativity bias in potency is also illustrated in the Hindu caste system, where contact with lower castes produces much more contagion than does contact with higher castes. Among the Hua of New Guinea (Meigs, 1984), perhaps the most contagion sensitive of all cultures studied, there is abundant positive contagion, but negative contagion remains more powerful.

There is relatively little data on dominance effects (greater effects of contaminants as opposed to purifiers, over and above their rated potency). We have some unpublished data (Rozin & Royzman, 2000) that indicates that combinations of negative and positive contagion (e.g., a sweater worn by a disliked and then a liked person, or vice versa) is rated more negative than the algebraic sum of the subjective evaluative ratings of each sweater separately.

It is notable that contagion is both a domain of manifestation of negativity bias and a theory for why it occurs. That is, in general, negative events may have more penetrance or contagiousness than positive events.

Asymmetric weighting and racial purity. Certain practices of designating a racial underclass in relation to its ancestral roots proffer another compelling (and politically consequential) example of negativity bias at its bluntest. In the words of Neil Gotanda (cited in Lopez, 1996), “The metaphor [for defining a racial underclass] is one of purity and contamination: White is unblemished and pure, so one drop of ancestral Black blood renders one Black. Black is a contaminant that overwhelms white ancestry” (p. 27). Of particular interest, from this perspective, is the notorious “one drop of blood” rule of racial categorization, having its formal origins in provisions of the Code Noir (the “Negro Code”) of 1685, designed, in part, to safeguard the “purity” of the White race by eliminating “tainted” blood (the rule enjoyed considerable vogue in certain parts of postcolonial America, e.g., Alabama, Arkansas). The

rule is that “any known African ancestry renders one Black” (Lopez, 1996, p. 27). As Lopez pointed out, in accordance with this rule, “no ‘mixed-race’ applicant was naturalized as White” (p. 27). There exists no historical evidence for the positive equivalent of a “one-drop” ordinance—that is, a statute whereby one’s membership in a racially privileged class would be assured by one’s being in possession of “one drop” of the racially superior blood (a situation of some bearing here is the determination, often for purposes of marriage or succession, as to whether a person is of a “royal” line; certainly, in this case, the royal blood can represent less than half of the total “blood,” but we know of nothing like a one-drop rule).

The Nuremberg laws, promulgated by the Nazis in the 1930s to define and persecute Jews, forced a definition for Jewishness. The one-drop rule here would have been impossible to enforce; instead, the rule was that one Jewish grandparent was sufficient for the designation as Jewish. It is interesting in this regard that in the affirmative action debate in the United States, where previously stigmatized and contaminating groups, especially Blacks, are now given preference, nothing like a one-drop rule has been instituted. It is rather general resemblance and associations with members of the previously stigmatized groups that makes one eligible for privileged treatments. Thus, when “Black was bad,” a one-drop rule justified inclusion in the category, but a much more substantial link is required for Black status now that, in some contexts, “Black is good.”

Decision Making

Loss aversion, one of the most fundamental and well-documented biases in information processing, is a quintessential illustration of negativity bias in the form of potency. The principle of loss aversion, based on the prospect function, holds that losses are more negative than corresponding gains are positive (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991). In its boldest form, losing \$10 is worse than winning \$10 is good. Although we are convinced of the general validity of loss aversion, and the prospect function that describes and predicts it, we confess that the phenomenon is only realizable in some frameworks. In particular, strict loss and gain of money does not reliably demonstrate loss aversion (unpublished data by the authors). Perhaps the most robust demonstration of loss aversion is in the endowment effect (Kahneman et al., 1990), in which the loss is framed as loss of a “possession” and the gain as acquisition of the same possession. Under these circumstances, in a number of cases, the loss of a possession, literally just given at random to the participant, is valued at somewhere around twice

the monetary value as the gain of the same possession by someone who does not currently possess it.

A general limitation of one class of loss aversion studies is that they require an objective metric of value, almost always money, against which to measure subjective value. Money is a nicely scaled objective value, but it may have some special properties that compromise it as a metric. In particular, it may reduce loss aversion effects by virtue of its fungibility and promote a "rational" mode of thinking (Rozin, Grant, Weinberg, & Parker, 1999).

The endowment effect allows one route around money, because it involves loss or gain of the same entity, and hence one can presume the objective value is equal in either case. Framing is another route around the money metric; the same objective transaction can be framed as either a gain or a loss. Thus, it is reported that people are more inclined to use credit cards when the alternative is described as a discount for cash (a gain) rather than a surcharge for use of the credit card (a loss).

There is a second heuristic that can be seen to be derivative from loss aversion. This is the principle that there is risk aversion for gains and risk seeking for losses. This bias can be derived from the idea that a certain loss is particularly undesirable (loss aversion) and hence encourages risk taking. Some of the more robust findings in the study of heuristics and biases demonstrate the risk seeking for losses phenomenon. For example, people are much more likely to take risks to avoid the certain loss of 400 out of 600 lives than they are to take risks in the face of saving 200 of 600 lives.

There is very little data on negativity dominance in the loss aversion literature. This is undoubtedly because the prospect function does not predict negativity dominance. That is, once one has subjectively equated losses and gains, there is no reason to predict that the combined outcome would be negative. Note that, although the bulk of data on loss aversion comes from between-subject designs (which avoid presentation of the "bald" facts to the participant), dominance studies require the direct comparison. In our experience, asking participants to judge the net hedonic value of losing and gaining \$100, or losing and finding a possession, leads to surprise and, for most participants, the obvious response of "zero." This can be avoided by using previously equated different entities, such as a food rated +4 and a musical selection rated -4 on an hedonic scale. Another alternative is to simply combine negative and positive events with previous subjective ratings and show that the overall hedonic valuation is more negative than the averaged evaluation of the components. We have collected some data suggesting such a negative dominance effect, using foods previously contacted in

preparation by, or sweaters worn by, both desirable and undesirable people (Rozin & Royzman, 2000).

We also gathered informal data suggesting that people regard pains as more real than pleasures of equal intensity. College students ($n = 14$) were asked to imagine that they had before them a little red button that, if pressed, would give 1 min of intense pain to one individual and (Version A) 10 min of similarly intense pleasure to another individual or (Version B) 1 min of similarly intense pleasure to 10 individuals. All of the participants declined "to purchase" pain with pleasure under either scenario. When the students were asked to put some number instead of 10 that would make them change their mind, the lowest number was 800 for Version A. Under Version B, all except one student said that no number would suffice.

Development

There are no compelling predictions that the negativity bias hypothesis makes about development, other than the occurrence of the various manifestations of negativity bias features demonstrated in adults. Very few of these have been probed or demonstrated in children.

However, there is a feature of human development that is supportive of the negative bias position. Bridges (1932) observed infants in the 0- to 2-year-old range, rating behavior in terms of the presence of various emotions. The earliest expressions, in the first months of life, are general excitation and distress, with no clear positive expressions. Anger, disgust, and fear appear around 6 months of age. A positive expression ("delight") was apparent at 3 months, somewhat after distress appeared, but no other positive expression or actions appeared until 12 months, when elation and affection are reported. Little information is provided about the criteria for these designations, so this study must be taken only as suggestive, but the point is surely worth exploring.

As mentioned earlier, Steiner (1979) reported that, when adults judge emotions of videotaped infant faces, they show better performance with responses to bitter and general aversion than they do with positive faces (induced by sugar in the mouth).

Impression Formation

It is in the domain of impressions of persons that negative bias has its longest and fullest history in psychology. The explicit references to the process of negativity bias (Fiske, 1980; Kanouse & Hanson, 1972; Lewick et al., 1992; Peeters, 1971) have centered on the impressions phenomena, and negativity bias theories in psychology also center in this area.

There have been thorough reviews of negative bias in impressions (Baumeister et al., in press; Fiske, 1980; Skowronski & Carlston, 1989), so we will limit our discussion here.

The core and paradigm setting study in this area is Asch's (1946) classic study. Asch employed lists of terms describing people, using a between-subject design and typically varying only one feature of a description (presence or absence of a trait, or change in ordering) between groups. Asch, himself, did not explore negativity bias, but he did promote the idea that the total impression, and its valence, was not the algebraic sum of its components. This study, both conceptually and methodologically, gave birth to an enormous literature on impressions of persons. With respect to our theme, almost all of these studies involve the combination of negative and positive traits and hence fall under the rubric of negativity dominance.

A robust negative bias in impressions studies has been consistently demonstrated, dating from Jordan (1965) and Kanouse and Hanson (1972); the early work is well reviewed by Fiske (1980). These and other findings encouraged a variety of theoretical accounts. Kanouse and Hanson introduced the lower frequency of negative events and their consequent greater extremity (from the positive baseline that results from their lower frequency). Skowronski and Carlston (1989) offered a comprehensive review of theories and proposed a category diagnosticity theory. They emphasized the extent to which a characteristic is diagnostic of the category in question, which is to say, a feature of most or all members of the category and as few nonmembers as possible (a perfect discriminator, like the placenta for mammals, having a diagnosticity of 1.0). The claim is that highly diagnostic characteristics will be more heavily weighted in impressions and that, generally, extreme and negative behaviors are more diagnostic. Although frequency and diagnosticity may often covary, they can be separated.

Frequency and diagnosticity theories both predict a positive bias in cases where the positive trait is rarer. Skowronski and Carlston (1992) demonstrated this effect, showing that dishonesty (more diagnostic than honesty) dominates honesty, whereas high intelligence (more diagnostic than stupidity or low intelligence) dominates stupidity. A person who behaves highly intelligently on one occasion, and stupidly on three occasions, is still seen as intelligent.

Fiske (1980) and Wojciszke, Brycz, and Boreknau (1993) implicated extremity of a trait as another potent influence and as a moderator of the negativity bias effect. Negativity bias effects appear much more clearly when extreme traits, both positive and negative, are included as instances. This result harkens back to the steeper negative gradient phenomenon, referred to in the taxonomy and discussed later.

More recently, Lupfer, Weeks, and Dupuis (2000) noted that almost all of the evidence for negativity bias in impressions comes from situations in which both negative and positive traits or behaviors are attributed to the target person. They demonstrated an absence of negativity bias in comparisons of all positive attributes versus all negative attributes impressions. This important study has particular significance for the taxonomy that we have presented, because it puts the negativity bias in impressions phenomena squarely in the domain of negativity dominance, rather than negative potency.

Empathy

Empathy is a nominally neutral term. According to definition, it is a psychological process that "involves sharing the perceived emotion of another—'feeling with' another" (Eisenberg & Strayer, 1987, p. 5), "an affective response that is more appropriate to the other's situation than to one's own" (Hoffman, 1987, p. 53), or "a cognitive awareness and understanding of the emotions and feelings of another person" (*Reber's Dictionary of Psychology*, 1991, p. 238). However, empathy is far more commonly used in the negative sense, as an indication of one's compassion, sympathy, or pity. Ironically, the very same authors (e.g., Eisenberg, Hoffman) who define empathy with no regard for valence give exclusively negative instantiations of the phenomenon and experimental models of empathy-elicitation and development (e.g., Batson & Coke, 1981; Hoffman, 1987) analyze it in predominantly negative contexts.

Thus, there appears to be a glaring disparity between what Kenny (1963) would consider the "formal object" (p. 189) of empathy (any emotional experience of another sentient being) and its particular empirical referent (another's negative state, e.g., physical suffering, grief, fear, disappointment). Expressions of empathic joy are somewhat unusual. Thus, if A tells me, "I just got engaged," it would be odd, if not downright uncouth on my part, to reply, "You have my empathy" precisely because of the implication that I view A's engagement as some kind of adversity. On the other hand, on the purely linguistic level, we find that (a) there is no term in English and at least a number of other languages that specifically denotes "feeling well (with or for) at the sight another's happiness," (b) there are numerous terms that specifically denote a vicarious affective response to another's distress (the English pity, sympathy, compassion; in Russian—sostrodatie [cosuffering] and soboleznavanie [feeling another's pain]), and (c) the supposedly generic terms, like empathy or the Russian sochustvie (feeling what another feels), are, in practice, synonymous with the terms that signify our affinity with another's negative state (see Royzman & Kumar, 2001).

The apparent preponderance of negative over positive empathy is not restricted to the world of human adults. As Thompson (1987) commented in one of the few passages in the psychological literature that deal specifically with the positive–negative empathy asymmetry,

There is reason to believe ... that adults as well as young children are more likely to respond empathetically to salient expressions of negative emotions in others. The hypothesized functions of empathic arousal in human adaptation enlist empathy primarily in response to others' distress cues. Similarly, from the ethological perspective, human infants are thought to be highly sensitive to social cues that are relevant to protection from threat, and this is more likely to entail distress signals. (p. 139)

Rousseau (1762/1950) was so thoroughly imbued with the practical aspect of this insight that he made it one of the (less known) cornerstones of his pedagogical system:

First Maxim: It is not in the human heart to put ourselves in the place of those who are happier than ourselves, but only in the place of those who are most to be pitied. From this it follows that to incline a young man to humanity, instead of making him admire the brilliant fate of others you must show him the sad sides of things and make him fear them. (pp. 184–185)

To reiterate, although the “standard” definitions of empathy stated at the beginning of this discussion envision an empathic experience as something unvalenced, in actuality, the empathic reaction appears to be principally to a narrowly defined set of highly negative affects—for example, fear, grief, disappointment, and so forth. It seems to be more difficult to be “contaminated” by, and react empathetically to, another’s euphoria or pride. The putative higher contagion of misery than joy seems to be the reason why literary art is so heavily geared toward the depiction of suffering (because aesthetic contagion utilizes our more general empathic mechanisms) and prosocial behavior is generally understood as alleviating other people’s distress rather than maximizing other people’s joy.

Another asymmetry in empathy has to do with the targets of empathy. Instances of positive empathy are disproportionately directed at individuals close to the target person, whereas instances of negative empathy extend broadly to people all over the world.

There is an adaptive account of the preponderance of negative empathy. The experience of negative empathy is likely to motivate specific helping behaviors that, at least for related others, would be beneficial. On the other hand, there is little in the way of response that is warranted by the good fortune of others.

Moral Judgments

Whatever the theoretical account (and the frequency or diagnostic account seems quite appropriate here), the enormous negativity bias in judgments of character is striking. The literature on morality in psychology (and philosophy; see Kupperman, 1991) is highly biased to analysis and experimentation with scenarios involving a single moral judgment or offense. These form, in many ways, the most tractable basis for analysis and experimentation. However, this emphasis has slighted the study of moral trajectories, or character (Kupperman, 1991). It is in character, or net worth, as it were, that the phenomena of negativity dominance in morality play out, and it is thus in the person perception literature, rather than the morality literature, that we find relevant studies.

Rather extreme immoral acts have an almost indelible effect; for many people they are unforgivable. This fact has been noted widely; we offer here two literary sources:

So, oft it chances in particular men,
That for some vicious mole of nature in them,
As, in their birth—wherein they are not guilty,
Since nature cannot choose his origin—
By the o’ergrowth of some complexion,
Oft breaking down the pales and forts of reason,
Or by some habit that too much o'er-leavens
The form of plausible manners, that these men,
Carrying, I say, the stamp of one defect,
Being nature's livery, or fortune's star,—
Their virtues else—be they as pure as grace,
As infinite as man may undergo—
Shall in the general censure take corruption
From that particular fault: the dram of eale
Doth all the noble substance of a doubt
To his own scandal.
(Shakespeare, quoted in Greenblatt, 1997, Hamlet, Act I, Scene 4, p. 1682)

Consider also the notion of “the tragic flaw,” typically a single failing in an otherwise admirable character, that brings about the ruin of the character in classic Greek drama and later drama as well:

Oh! I can feel it now: nought can soothe
us midst our worldly cares, but the conscience!
But if, through chance, it's scarred, by but a single
stain, ... a single stain ... then woe and misery!
As from a deadly sore, the soul then burns, the heart is
drenched in venom, and reprove, as if some pealing
hammer, fills the ears.
One's sick all over, and the head is whirling,
and bloody lads appear before the eyes ... And one
would flee, save one can find no shelter ... agony!
He is wretched most whose conscience is unclean.
(Pushkin, 1825/1978, Boris Godunov, p. 219)

Consider also the slip of the tongue, or single questionable action (re Gary Hart's admission of one indiscretion) that ruins a promising career. With reference to status in street gangs, Anderson (1984) noted that "In street culture, especially among young people, respect is viewed as almost an external entity that is hard-won but easily lost, and so must constantly be guarded" (p. 82). The fragility of moral purity in the Hindu system is yet another example—hard to attain and maintain, easy to lose by a single polluting act.

It seems to us that frequency and diagnostic accounts, although clearly relevant and with some explanatory power, are not able, on their own, to account for the negativity bias in moral judgment. After all, heroic acts are surely as infrequent and diagnostic as immoral acts, yet murder is rarely balanced, in the judgment of people, by a single heroic act. In a recent survey with a few hundred introductory psychology undergraduates, we asked how many lives a person would have to save, each on individual occasions and each at risk to his or her own life, to be forgiven for the murder of one person. The median was 25 (Kurzer, Rozin, & Royzman, 2000).

When we shift the focus from moral incidents to moral trajectories—that is, to character—we almost invariably place ourselves in the framework of negativity dominance because most lives are a mixture of morally admirable and questionable acts. It is possible, referring back to Lupfer et al. (2000), that there would not be a negative bias in the comparison of morally exemplary and totally immoral characters.

Negativity Dominance and Cognitive Distortions

One of the fundamental tenets of the cognitive model of depression (A. T. Beck, 1976) is that individuals suffering from this disorder exhibit a systematic negative bias in the processing of complex valenced information (i.e., the information that has both positive and negative characteristics). This tendency leads them to pay inordinate attention to the negative aspects of a situation, an object, or a person, while assiduously ignoring or discounting the object's positive aspects or attributes. This pathological tendency (which expresses itself in a variety of processing errors or "cognitive distortions," including the *disqualifying the positive* distortion, the *magnification or minimization* distortion, the *mental filter* distortion, and the *tunnel vision* distortion; J. S. Beck, 1995) bears a striking resemblance to what we discussed earlier as the synchronic subtype of negativity dominance, the principle of evaluation positing that "the holistic perception/appraisal of integrated negative and positive events (or objects, individuals,

hedonic episodes, personality traits, etc.) is more negative than the algebraic sum of the subjective valences of those individual entities." We speculate that these cognitive distortions represent an abnormally amplified, persistent, self-regarding version of the penchant for negativity dominance that is part of a normal evaluative response. If this conjecture is correct, one may predict that subclinical individual differences in negativity bias will be an index of a person's potential for depressive ideation.

Negative Differentiation

There is substantial evidence suggesting that responses to negative events are more differentiated and complex. The organism probably has more appraisal to do on negative events, because the response options are more varied (fight, flight, slow withdrawal, or freezing), as opposed to the straightforward approach response to positive events. The evidence that is relevant (some of it reviewed in Peeters & Czapinski, 1990, and Taylor, 1991), falls into three categories, which we will consider in turn.

Negative events elicit more attributional activity.

Negative events elicit more causal attribution than positive events (Bohner, Bless, Schwarz, & Strack, 1988) and are perceived as more complex (documented and reviewed in Peeters & Czapinski, 1990). Across cultures, people seem to seek more explanations for negative than positive events (A. Fiske, personal communication).

Roese and Olson (1997), following on norm theory (Kahneman & Miller, 1986), demonstrated that counterfactual thinking, a form of concern about and replaying a past outcome, is more likely in the context of negative events and negative emotions. People seem to be particularly motivated to undo past unpleasantness. Kahneman and Miller (1986) also noted that the "affective response to an event is enhanced if its causes are abnormal" (p. 145). Because negative events are rarer, they may fall under this account, as being more abnormal. Baumeister et al. (in press) considered this feature of negativity bias in much more detail.

Language: Greater cognitive elaboration of negative events. The vocabulary used to describe the qualities of physical pain is far richer and more varied than that employed to depict the qualia associated with physical pleasure, suggesting that our cognition is more complex, elaborated, and fine-tuned when it co-

mes to the occurrences of the former. This is our list of pain and pleasure descriptors:

Pain (31 words): deep, intense, drilling, boring, dull, sharp, aching, burning, cutting, pinching, piercing, tearing, twitching, shooting, raking, gnawing, itching, stabbing, nipping, sticking, thrusting, hard, throbbing, (dragging), penetrating, lingering, fitful, radiating, (breathtaking), bitter, pricking, (vicious), (monotonous), biting, incising.

Pleasure (14 words; partly based on a review of erotic literature): intense, thrilling, sharp, delicious, exquisite, deep, fluttering, lingering, radiating, sumptuous, breathtaking, electrifying, delicate, sweet.

The substantially greater (350 msec) reaction time in matching a negative adjective to the designation negative, as opposed to a positive adjective to the designation positive, is most easily interpreted as more complex or deeper processing of the negative, although there are other accounts, such as simply reversing a natural tendency (Osgood & Hoosain, 1983).

Emotions: Greater number of categories and response options on the negative side. “All happy families resemble one another; every unhappy family is miserable in its own way” (Tolstoy, 1875/1998, p. 1). The elicitors of negative emotions are conceptually more varied, and there are more response outcomes that are appropriate for negative elicitors. (On the contrary, it is probably true that there is more between-individual variation in what elicits positive affect, as opposed to negative affect; the elicitors of the latter, although highly varied, tend to be more similar across people. The idiosyncratic nature of most pleasures is precisely what makes their induction so difficult in a laboratory and makes public policy directed at improving pleasures somewhat problematic.) The multiplicity of responses implies a more complex processing system, at least at the final stages before output. Because emotions are often interpreted as action tendencies, the wider range of potential responses to negative events links directly to the observation of a larger number of negative than positive emotions. None of this escaped the founder of experimental psychology, Wilhelm Wundt (1896), who wrote the following:

Obviously language has produced a much greater variety of names for unpleasant emotions than for pleasurable. In fact, observation renders it probable that unpleasant emotions exhibit a greater variety of

typical forms of occurrence, and that their different forms are really more numerous. (p. 180)

Similarly, Titchener (1908) noted in his introductory text that “... language has but few words to express pleasurable emotions” because of more varied “bodily manifestations of unpleasant emotions” (p. 243).

Carlson (1966) reviewed emotion terms in 172 introductory texts, published over the period from 1877 to 1960. He recorded 20 pleasant emotion terms, and 30 unpleasant emotion terms, and reported that 74.8% of the pages in the emotion chapters referred to negative emotions. Furthermore, when students were asked to name emotion terms, 35.2% were positive and 61% were negative. Averill (1980) as well reported fewer positive emotions from nonverbal indicators and reported that 62% of a large number of adjective emotion terms were rated as negative. He also reported a weak tendency for positive emotional words to be used more.

There is a larger number of “basic” negative emotions as opposed to “basic” positive emotions, a point noted by Izard (1971). We present here a list of the major taxonomies of emotion (Table 1), all of Western origin except that from the ancient Hindu texts, the Natyashastra (Hejmadi, 1999). Unlike all other taxonomies, the Hindu list has equal numbers of positive and negative emotions. This difference is surely worth exploring and may have something to do with the fact that this is the only taxonomy that comes from a “collectivist” society.

The most straightforward account of the thrust of the results described is that the greater set of response options in the negative domain promotes a more differentiated set of emotional expressions because their contact should signal appropriate action to conspecifics. On the other hand, Averill (1980) suggested an interesting additional influence. Emotion implies a sense of diminished responsibility (at least in English), and this frame discourages classification of positive acts as produced by emotion. People are rarely described as overcome by charity.

Language: A negativity bias in lexicalization of negative events. There are a number of common-usage one-word terms with negative connotations whose positive opposites, although conceptually conceivable, simply do not have any simple, one-word linguistic representation. Consider, for example, “risk” as it is commonly used in law or medicine (in the sense of a future outcome that is both negative and uncertain, i.e., “bad chance”). Opportunity apparently does not qualify as an opposite. One would be hard-pressed to say (at least in English), “he has a 50% opportunity of walking again.” Apparently there is no single unambiguous word for “a chance of some propitious occur-

Table 1. *Emotion Taxonomies*

Source	Date	Anger	Fear	Sad	Disgust	Contempt	Guilt	Shame	Interest/Curiosity	Surprise	Happy/Joy	Love	Other Positive
Natyasastra*	A.D. 200	X	X	X	X	X	X	X	X	X	X	X	4 ^b
Darwin	1872	X	X	X	X	X	X	X	X	X	X	X	1 ^c
W. James	1890	X	X	X									1 ^d
Woodworth	1938	X	X		X					X	X	X	
Tomkins	1963	X	X	X	X	X	X	X	X	X	X	X	
Izard	1971	X	X	X	X	X	X	X	X	X	X	X	
Ekman & Friesen	1975	X	X	X	X	X	X	X	X	X	X	X	
Plutchik	1980	X	X	X	X			X	X	X	X	X	1 ^e
Shaver et al.	1987	X	X	X						X	X	X	

*Hejmadi, 2000. ^bFour additional positive emotions: awe, heroism, peace, humor and amusement. ^cOne additional positive emotion: pride. ^dOne additional positive emotion: mirth. ^eOne additional positive emotion: acceptance.

rence" either in English or in almost all of the 17 languages we surveyed, all of which have a synonym for risk (Rozin, Berman, & Royzman, 2001). The same "asymmetry" holds for such commonly used terms as "accident," "catastrophe," and "murderer." "Savior," the best opposite for murderer, has strong religious connotations. In addition, the word is normally used for a person who saves many lives, whereas murderer is reasonably and usually applied to the loss of one life (Rozin et al., 2001).

Language: A positive bias that supports the negative bias frequency or information account.

Within the impressions literature, there is a documented positivity bias; this appears for the ability (as opposed to the moral) domain. This makes sense in terms of the frequency or diagnostic approach to positive and negative biases; immoral behaviors and outstanding ability-based accomplishments are both rare events. We now point to a second domain where positivity bias is evident, a finding also susceptible to the frequency or diagnostic account. The positive bias in language has been noted on a number of occasions, particularly by Osgood and his collaborators (Boucher & Osgood, 1969; Osgood, 1979; Osgood, May, & Miron, 1975) and in the book devoted to positive bias or the "Polyanna Principle" by Matlin and Stang (1978).

In the domain of language, with evidence primarily but not entirely for English, a positive bias appears in two ways: (a) positive words (usually adjectives, with a clear evaluative sign) occur much more frequently than negative words (reviewed in Matlin & Stang, 1978), and (b) positive adjectives "dominate" their negative opposite in a number of ways to be described (reviewed in Matlin & Stang, 1978). We argue that at least some of this effect derives from the same causes that have been invoked to explain negativity bias.

The evaluative dimension of words and concepts is one of their paramount features, as suggested by the ancient Chinese opposition of yin and yang. This opposition emerges regularly, as the first factor extracted in analysis of the attributes of words, confirming Wundt's (1896) initial suggestion of evaluation, potency, and activity as the three basic dimensions (Osgood, 1979). In a study across over 20 languages, there were about twice as many evaluative qualifiers commonly used as potency qualifiers (e.g., big) and more potency than activity (Osgood et al., 1975). Across languages, good is the most common qualifier, and the evaluative factor accounts for most of the variance in word attributes and meanings.

The higher positive frequency effect. Boucher and Osgood (1969), examining 13 languages, stated and

confirmed what they call the "Polyanna hypothesis": "There is a universal human tendency to use evaluatively positive words more frequently than evaluatively negative words in communication." Osgood et al. (1975) reported the frequency and breadth (contexts) of use of set of adjectives across over 20 diverse languages, using a composite score that increases with both frequency and breadth. "Good" scores higher than "bad" in all cultures, and "good" scores highest of all 60 common adjectives studied, in 8 of 22 languages (Osgood et al., 1975). Matlin and Stang (1978) reviewed these and many other studies, including many of their own, and made a very strong case for more frequent occurrence of positive words, principally but not entirely in English. However, they concluded that in terms of number of different negative and positive words, findings are mixed and there is no clear conclusion.

Positivity dominance. The various word positivity dominance effects described here are demonstrated for all or almost all of 17 languages in our recent study (Rozin et al., 2001). However, each was described, sometimes for English, sometimes for many languages, in at least one prior study (and many of the points we raise were documented by Matlin & Stang, 1978):

1. The unmarked positive. Greenberg (1966) showed, from many languages, that positive adjectives are usually unmarked (e.g., *happy*, *pleasant*, *intelligent*) and that negative adjectives can usually be generated from them by negating the positive attribute (*unhappy*, *unpleasant*, *unintelligent*). Furthermore, when negative adjectives do exist in their own right (e.g., *sad*, *aversive*, *stupid*), they are often not marked to generate a positive term (e.g., *unsad*, *unaversive*, *unstupid*). Matlin and Stang (1978) reviewed many other examples of this asymmetry. We confirmed the asymmetry with interviews of native speakers of 17 different languages (Rozin et al., 2001). This can be accounted for on the general principle of evolution of an efficient language: More common words would be expected to be shorter and more basic.

2. The positive term typically defines the dimension. Results from many languages suggest that typically, the positive term in a positive-negative pair is the term that is used to define the dimension defined by the pair (Greenberg, 1966; Matlin & Stang, 1978; Rozin et al., 2001). Thus, in English, the happy-sad dimension is called *happiness*, and the strong-weak dimension is called *strength*. The positive term tends to be used to describe both the positive extreme and the whole dimension.

3. The marked positive term is more extreme than the marked negative term. Perhaps as a consequence of the fact that the positive term usually defines the

dimension, the marked (negated) positive term usually represents the negative end of the dimension, whereas the marked (negated) negative term represents the neutral point. Thus, *unhappy* means sad, whereas *unsad* means neutral. This asymmetry appeared in most of the 17 languages we sampled (Rozin et al., 2001).

4. Positive precedence in frozen opposite comparisons. Freezes are fixed traditional word orders, such as "cat and mouse" or "now and then." There are no syntactic or obvious semantic rules that constrain the ordering, but there is a strong sense that a particular order is correct (Cooper & Ross, 1975). Cooper and Ross held that, in such orders of opposite valenced terms, the positive term usually comes first, as in *more or less, happy or sad, or win or lose*. The authors proposed that positive words are easier to process, and that there is some greater efficiency in leading with them. But they also reported that the order is often reversed in Hindi. Our study of 17 languages indicated that in almost all cases for word pairs and for languages, the positive term typically leads (Rozin et al., 2001).

Theory

We identify three types of theories of negativity bias: *adaptive or evolutionary accounts*, focusing on the adaptive value of the principles; *developmental theories*, focusing on the ontogeny of the principles; and *mechanistic theories*, which try to account for the instantiation and manifestations of the principle, online. The presence of negativity bias, in various forms, in both animals and humans, encourages the promotion of at least some accounts that do not require the mediation of language or human culture.

The Adaptive Value of Negativity Bias

There are four theoretical accounts of the adaptive value of negativity bias. These adaptive accounts are mutually reinforcing and are all likely to be operative, and derive from us and from a number of prior authors (Cacioppo et al., 1994, 1997; Lewick et al., 1992; Taylor, 1991):

1. Negative potency. In the extreme, negative events are more threatening than are positive events beneficial. The clear example here is death, a final, irreversible event. Avoiding risks of death must be a matter of the highest priority in the evolutionary scheme; the peak of vigilance and investment would well be oriented to escape death. It is true that reproduction is the final measure of evolutionary success, but there are usually multiple opportunities to reproduce, and death

terminates these options. Of course, there are cases where death (as sacrifice to protect more reproductively capable relatives) contributes to inclusive fitness, especially when the organism in question is no longer capable of reproduction. Insofar as death and reproductive potential shape our decision processes and, in particular, negativity bias, these considerations suggest that the extent of our loss aversion may be programmed to vary with age. In particular, because women's reproductive capacity declines more with age than does men's reproductive capacity, gender differences in loss aversion might appear at the time of menopause, and there may be general age effects, as well. Of course, such effects might be moderated, especially in humans, by the many ways in which older adults can improve the fitness of their children and grandchildren.

2. Greater negative informational complexity. In general, positive entities are things to be approached and engaged. The link between appraisal and action is typically straightforward. Negative events, on the other hand, require a more sophisticated appraisal, because the options for action are more varied. These include approach (as in certain forms of threat, as mediated by the emotion of anger), freezing (sometimes appropriate in fear situations), withdrawal (sometimes appropriate when resources at hand are not adequate to deal with a situation), and fleeing (e.g., in the face of certain fear related threats). It is for this reason (mentioned earlier) that, at least in Western emotion taxonomies, there are more negative emotions (interpreted here as action tendencies; see Frijda, 1986) than positive emotions.

3. Negative events often develop more rapidly and require a rapid response. The model, of course, is predator threat. This is not a time for trial and error.

4. Negative events are more contagious and hence have more negative potential. The basic model here is the germ, for which there is not an obvious positive parallel. Minimal exposure to germs can lead to maximal effects, because germs, unlike most other negative or positive entities, are self replicating. We suggest that this germ feature may be the origin of negative contagion effects, which has, by a process of preadaptation, spread through other domains of life (such as morality) just as a germ would (Rozin, Haidt, McCauley, & Imada, 1997).

Developmental Theories

Given the adaptive advantage of particular vigilance with respect to negative events, it is quite reasonable to suppose that the negative bias is a built-in predisposition. Its presence in animals lends support to this idea. Furthermore, the opportunities for gradual learning to avoid death-threatening events may be minimal. Menzies and Clarke (1995) argued for innate

accounts of phobias and phobic predispositions, on the grounds of the terminal consequences of many negative events (like falling off a cliff). Innate fear to entities such as enlarging looming objects suggests that there is at least some inborn equipment designed to facilitate exit from, or termination of, threatening situations. There is little data available, but we expect that organisms are genetically predisposed toward greater weighting and attention to negative events. On the other hand, the organism has ample opportunity to learn that most events are positive, and that rarer, negative events, are more threatening and offer more adaptive options for response.

Neural Aspects of Negativity Bias

There is now abundant evidence, from studies of behavior in animals (e.g., Berridge & Grill, 1984) and humans (e.g., Cacioppo et al., 1994, 1997, 1999; Diener & Emmons, 1985; Watson, Clark, & Tellegen, 1988), that the negative and positive affect systems may operate quite independently at some important level prior to the generation of responses. As Cacioppo et al. noted, the constraints of action, often manifested as approach and withdrawal, may force a negative and positive summation at the response level, but there is good evidence that the negative and positive are separately represented at an earlier stage, which they call the stage of evaluative categorization. This evidence includes work on the nervous system. Ito, Larsen, Smith, and Cacioppo (1998) demonstrated larger event-related potentials for negative events in neutral contexts than for equally rare, equally valenced positive events in the same neutral contexts. Also, there seems to be an evaluative division of labor in the cortices, with the right side of the brain associated with negative affect (Davidson, 1991). This separation would presumably facilitate operation of a system that enhanced negative affect, relative to positive affect. As Cacioppo et al. pointed out, separate loci for the accumulation of positive or negative effects allow for separate currency functions (incremental rise in affect with input) for positive and negative systems. This arrangement also allows for the demonstrated somewhat independent variation of negative and positive affect, which can both be high or both be low at any given moment, although they are often reciprocally related.

Mechanistic Theories of Negativity Bias

The first two theories we present arise principally from the impressions literature (see discussions by

Fiske, 1980, and Skowronski & Carlston, 1989) and were briefly discussed in the aforementioned treatment of impressions.

Frequency and diagnosticity. Organisms are built to attend to change and to attend to more informative events. The demonstrated much lower frequency of negative than positive events makes the negative events more informative. Hence, this general informational bias would work in the service of negativity bias, as has been noted by a number of investigators (Fiske, 1980; Kanouse & Hanson, 1972; Lewick et al., 1992; Peeters, 1971; Peeters & Czapinski, 1990; Skowronski & Carlston, 1989). This position gains support from the fact that a positivity bias is observed in instances where positive events (such as manifestations of very high ability) are rarer (Skowronski & Carlston, 1992).

Range Frequency

As with the informative event formulation, another general “adaptation” principle leads to a negative bias in low frequency negative domains. Based on adaptation level theory (Helson, 1964), and its expansion into range-frequency theory by Parducci (1995), it follows from the higher frequency of positive events that the evaluative neutral point moves in the positive direction. A consequence of that, assuming that the initial magnitude of positive and negative events is about equal, is that negative events become more potent because they are now further from the acquired neutral (formerly positive) baseline than are positive events. Of course, even if negative events are originally more potent, this process would act to further enhance relative negative potency. Along with the informational value view just discussed, this position would predict a positive bias in domains where there is a higher frequency of negative events, such as performance on difficult tasks or gambling.

Contagion

We have commented on the high negative contagious potential of negative events, perhaps originating from reactions to germs. This fact about the world could be mirrored in the way the organism and brain process negative events. Negative events may inherently (or conceivably by acquisition) be more contagious, generalize more to neighboring domains, and be more resistant to elimination. There is clear evidence from the contagion literature (Nemeroff & Rozin, 2000; Rozin & Nemeroff, 1990; Rozin et al., 1989) indicating that negative entities transfer properties by

contact much more than do positive entities. Contagion is particularly appropriate as an account for situations in which both positive and negative factors are present—that is, for cases of negativity dominance. We note that both the most robust and most common instances of negativity bias, including in the impressions literature (e.g., Lupfer et al., 2000), involve such negative-positive combinations.

Purity and Perfection

Perfection and purity instantiate actually sought goals of humans in many domains. Although we typically settle for something that is less than perfect, we often judge things in terms of their distance from perfection and sometimes dichotomize into the tiny perfect, and enormous imperfect, categories. This is clearly expressed in various religious traditions that focus on purity. The human penchant for certainty may be another manifestation of this principle; people will pay much more to eliminate a risk than to reduce the risk, when the actual reduction in risk is the same in both cases (as in reducing a risk from 1% to .5% vs. .5% to 0%; Baron, Gowda, & Kunreuther, 1993). It is also common knowledge that among most collectors, “perfect” (unused, unsullied in any way) items demand by far the highest prices.

Tolstoy (1875/1998) began Anna Karenina with the statement, “All happy families resemble one another; every unhappy family is miserable in its own way” (p. 1). One meaning of this trenchant quote is that it is very hard to achieve perfection, and there are many ways to fail to achieve it. Blemishes can spoil kosher meat, or beautiful faces, or gems. Another statement of the same idea is in the proverb, “a chain is as strong as its weakest link.” If perfection is a sought-after goal, then we are very vulnerable to loss of this desirable state in myriads of different ways. The perfect standard primes negativity bias.

Theory and the Negativity Bias Taxonomy

The taxonomy of negativity biases we present provides a structure for the generation and evaluation of theories. Particular theories may be more appropriate for particular types of negativity bias. Thus, contagion is particularly appropriate for negativity dominance and negative potency and has little to say about differentiation. On the other hand, the asymmetry of death is most related to potency accounts, and the multiple options for response to negative events applies uniquely to negative differentiation. The frequency and diagnosticity accounts may relate to both potency and

dominance, as perhaps do the impressions phenomena that gave birth to them.

Negative potency, which has been implicitly the predominant theory prior to this article, may actually have two instantiations, as suggested by the work of Cacioppo et al. (1994, 1997, 1999). The enhancement of negativity may occur at both the level of integration of negative and positive representations, in preparation for response, and at some prior level. Furthermore, the definition of potency may have two instantiations, as suggested by some of the empirical research, especially on impressions. In the narrow form, as described in loss aversion, potency means that objectively equal oppositely valenced stimuli are subjectively unequal, with the negative stronger. However, it also appears that even when there is subjective equality, negative stimuli still seem more potent. The question is whether this residual negative potency is only manifested in combination and hence falls under negativity dominance, or might operate in isolation.

Conclusion

We do not offer a general, simple theory of negativity bias. We believe that more than one phenomenon is involved and doubt that there is one theory to account for all (in accord with Taylor, 1991). Rather, at the adaptive, developmental, and mechanistic levels, we presume there are multiple contributions to the bias; negativity bias is both multidetermined and overdetermined. However, it is far from universal. Furthermore, as Taylor noted, this very bias may be the cause of a range of adaptations to modulate the response to strong negative effects after they occur. This could be one account of the apparent lack of greater potency for negative memories.

We believe that organisms have evolved to deal with both the most frequent and the most important events in their lives; when frequency and importance are negatively correlated, as we believe is generally the case for negative and positive events, there are likely to be complexities in systems that deal with appraisal or response to negative and positive events. This is exactly what we see. The diagnosticity account, in its fully elaborated form (e.g., Skowronski & Carlston, 1989), is adequate to explain some of the occurrences of positivity and negativity biases. The fact that it predicts the inversion from the moral to the ability domain testifies to the potency of frequency and diagnosticity. On the other hand, in our view, this type of account is not helpful in certain domains, such as those that involve negative differentiation or those that invoke contagion. We are inclined to believe that it will be necessary to invoke both purity as an important human ideal and greater contagiousness of negative entities, to

account for some of the instances of negativity bias. We conclude that what is required is an analysis in the framework established by Peeters and his colleagues (Peeters, 1971, 1989; Peeters & Czapinski, 1990) and more recently by Cacioppo and his colleagues (Cacioppo et al., 1994, 1997, 1999), an interplay of positive and negative biases.

One of the major tasks of future research in this area will be to designate those domains in which negativity bias and positivity bias are manifested. We want to leave the reader with the sense that there really is a negativity bias, a meaningful and adaptive one, in much of human and animal cognition and behavior. There is still some taxonomic work to do, and a great deal of analysis. In our hope of making a better world, it should be important to understand and perhaps intervene in some manifestations of negativity bias.

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