

# Hedonic “adaptation”: Specific habituation to disgust/death elicitors as a result of dissecting a cadaver

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## Abstract

People live in a world in which they are surrounded by potential disgust elicitors such as “used” chairs, air, silverware, and money as well as excretory activities. People function in this world by ignoring most of these, by active avoidance, reframing, or adaptation. The issue is particularly striking for professions, such as morticians, surgeons, or sanitation workers, in which there is frequent contact with major disgust elicitors. In this study, we study the “adaptation” process to dead bodies as disgust elicitors, by measuring specific types of disgust sensitivity in medical students before and after they have spent a few months dissecting a cadaver. Using the Disgust Scale, we find a significant reduction in disgust responses to death and body envelope violation elicitors, but no significant change in any other specific type of disgust. There is a clear reduction in discomfort at touching a cold dead body, but not in touching a human body which is still warm after death.

Keywords: disgust, death, adaptation.

## 1 Introduction

Disgust is, in general, a negative experience which people seek to avoid or terminate (Rozin et al., 2000). However, humans live in a disgusting world. The air we breathe comes from the lungs of other people, the chairs we sit in were exposed to the buttocks of many others, our silverware was in the mouths of many others, the toilet seat we use in a public bathroom was touched by the bare buttocks of many unknown others, the money we use was handled by many other people, the air contains molecules vaporized from animal and human feces, most of the molecules in the water we drink were at one point or other part of urine and some once passed through the body of Adolph Hitler. Yet, humans negotiate their daily activities without much concern about these disgusting entities. They do so, in the same way that they are not crippled by thoughts of their mortality, by keeping these concerns in the background, out of consciousness. This is accomplished in a number of ways: 1. direct denial; suppression of disgusting implications; 2. reframing, that is, thinking of potentially disgusting things in other ways; 3. adaptation: ceasing to think of many of the potential disgusts as disgusting.

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For example, to illustrate denial, most people, when exiting a public bathroom, do not think about the fact that the metal knob or handle on the door that they are opening has been touched by many other unknown people, some of whom no doubt did not wash their hands. If reminded of this, as when the undesirable person in front of them opened the door on the way out of the bathroom, people might take a paper towel to open the door. On the other hand, to illustrate adaptation, the mortician who is preparing his hundredth dead body for burial is certainly attending to it, but has ceased, presumably by adaptation, to be disgusted by it. Finally, to illustrate reframing, one can reduce potential disgust about swimming in a public pool in which little children no doubt urinate while swimming, by noting that the ocean itself has a low level of urine in it, so that the swimming pool is just like a smaller instantiation of the ocean.

Individuals cope with many potential disgust elicitors encountered in a normal day such that they may experience disgust only a few times in a day. This problem seems most daunting for individuals whose professions bring them into contact with strong disgust elicitors repeatedly: morticians, sanitation workers, hospital orderlies, and surgeons, for example. It seems reasonable to suppose two different types of factors are at work in reducing disgust responses in such professions. First, individuals who are generally less disgust sensitive may be more likely to choose such professions. Second, cop-

ing processes of denial, reframing, and adaptation may be presumed to be activated and to become habitual or prepotent. Adaptation seems like the most likely candidate. In this study, we explore:

1. whether adaptation occurs as a result of extensive exposure to a particular class of disgust elicitors,
2. insofar as adaptation occurs, whether it is specific to the class of elicitors to which there was exposure.

We examine these questions for the case of first year medical students who spend 2–3 months dissecting a cadaver. We obtain measures of their general and specific disgust sensitivities and attitudes to dead bodies before and after this experience.

## 2 Method

With the cooperation of the director of the first year gross anatomy class at the University of Pennsylvania Medical School, and those students in the class who volunteered for this project, we administered a short questionnaire to the students a few days before they began their cadaver dissection, and again, within a few days after it was completed.

The questionnaire was anonymous. However, in order to match pre and post dissection forms, the first question of the first questionnaire asked the respondent to list some sort of identification number (such as a PIN) that he or she would remember, and be able to put on a later questionnaire.

The questionnaire asked for age, religiosity (on a five point scale), and included the 32 item modified DScale (Dscale2: Haidt, McCauley & Rozin, 1994; 2001). This scale included 16 “reactions” to potential disgust situations which respondents rated on the scale: **1** = Strongly disagree (very untrue about me); **2** = Mildly disagree (somewhat untrue about me); **3** = Mildly agree (somewhat true about me); **4** = Strongly agree (very true about me). For example, one item is “It would bother me tremendously to touch a dead body.” The remaining 16 items involved a description of a potential disgust situation, which respondents rated on the scale: **1** = Not disgusting at all; **2** = Slightly disgusting; **3** = Moderately disgusting; **4** = Very disgusting. The instructions continued:

“If you think something is bad or unpleasant, but not disgusting, you should write **1**”. A sample item is: “You see someone accidentally stick a fishing hook through his finger.” The scale is designed so that 4 items in each of the 2 formats are devoted to a particular type of disgust (core [foods, animals, body products], sex, death and body envelope violations, and interpersonal contact. Thus, there are four subscales, each composed of eight items. We also included the following seven questions,

composed specifically for this study:

How uncomfortable do you feel in each of the following situations?

(scale: 0 = not uncomfortable at all, 100 = extremely uncomfortable: use any value between 0 and 100)

1. Taking a splinter out of your own finger
2. Taking a splinter out of someone else’s finger
3. Watching blood being taken out of a vein from yourself (for a blood test of some sort)
4. Watching blood being taken out of a vein from another person (for a blood test of some sort)
5. Touching a human body, while it is still warm after death
6. Touching a preserved, dead, human body
7. Getting fully anesthetized for a “minor” surgical procedure (e.g., resetting a broken limb)

## 3 Results

Out of a class of 150–152 first year medical students, 69 responded to the initial questionnaire, and 56 to the post-dissection questionnaire. Unfortunately, some individuals did not produce a matching identity number on the first and second questionnaire. Altogether, we were able to collect 47 matched pairs of questionnaires, and the following analysis is carried out on these 47 pairs. Our basic measure is changes in the same item from after to before the dissection experience. Scores on each item or scale before and after dissection, and the difference between these scores, are presented in Table 1. The differences were evaluated for significance with paired t-tests (df=46).

Altogether, we examine 12 measures. One is the total disgust scale score, and four others (obviously not independent of the total score) are scores on the four subscales (core, death/body-envelope, sex, and interpersonal) of the disgust scale. The remaining seven measures are the seven items on discomfort specified in the method section. Of these 12 measures, 10 decreased in value after the dissection. The two exceptions (not significantly increased) were reactions to touching a warm dead body and interpersonal disgust.

While there is the predicted substantial decrease in discomfort at touching preserved human bodies, discomfort at touching warm dead bodies is actually slightly (non-significantly) increased. For this comparison, the adaptation that results from extended dissection of a preserved

Table 1: Disgust and related scores for 47 medical students pre and post cadaver dissection, means (and s.d.).

Item	Before	After	t(46)
Discomfort (0–100 scale)			
Remove splinter from own finger	14.89 (31.02)	8.19 (21.80)	1.452
Remove splinter from other's finger	16.51 (29.86)	8.36 (17.55)	1.853
Watch blood removed from own body	30.96 (34.83)	26.36 (32.85)	0.983
Watch blood removed from other's body	18.81 (31.21)	17.02 (23.40)	0.409
Touch still warm dead human body	43.86 (29.92)	48.70 (32.63)	1.036
Touch preserved dead human body	32.12 (23.23)	15.72 (21.82)	4.028***
Being anesthetized	37.45 (36.08)	29.70 (30.11)	1.833
Disgust Scale Measures			
Dscale2 Total	70.28 (12.69)	67.96 (12.21)	2.047*
Core subscale	19.64 (3.77)	19.51 (3.71)	0.270
Interpersonal subscale	15.40 (4.31)	15.74 (4.19)	0.929
Death/envelope subscale	17.36 (4.16)	15.53 (4.42)	4.665***
Sex subscale	17.87 (3.90)	17.17 (4.18)	1.849

\*  $p < .05$ , \*\*\*  $p < .001$ .

human body is quite specific. The results on the disgust scale confirm both that there is adaptation, and that it is specific. There is a significant decrease in “death and body envelope violation” disgust, but no significant decrease in any of the three other disgust components. There is a marginally significant ( $p < .05$ ) decrease in total disgust sensitivity, but this can be accounted for by the decrease in the death and body envelope violation items, which constitute one fourth of the disgust scale.

It is conceivable that as a group, medical students are less disgust sensitive than the rest of the population, since their profession promises to put them in more contact with bodily processes than the average person. Unpublished data are available (from J. Haidt) from a large group ( $n=295$ ) of University of Virginia undergraduates who completed the revised disgust scale (Dscale2) in 2002. Their mean score of 76.16 is slightly higher than the 70.28 initial score of the 47 medical students ( $t(340)=2.605$ ,  $p < .05$ ), suggesting modest pre-selection for disgust insensitivity in medical students. The medical students were lower on all four subscales, but by far the largest subscale difference was for the death/envelope subscale ( $t(340)=4.999$ ,  $p < .001$ ), with a difference of 3.76 points, larger than the sum of the other three subscale differences. So there is evidence for some selection for lower disgust sensitivity, especially in the death/envelope domain, for medical students.

There are two pairs of items (splinter and blood) for which we obtained discomfort scores for self and

other. There was not a significant difference, in the pre-dissection measures, between removing a splinter from self (mean = 14.9) and other (16.5), and the two scores correlated at  $r=.93$ . Students were more upset about watching blood being taken out of their own vein (mean = 31.0) than from another person's vein (mean = 18.8;  $t[46] = 3.297$ ,  $p < .01$ ), and these two scores correlated at  $r=.71$ . The change scores for splinter self and splinter other (before minus after dissection) correlated .93, and the equivalent blood scores correlated .84.

A principal component factor analysis of the seven “before” measures of blood, dead body, splinter removal and anesthesia discomfort revealed two factors (Varimax rotation), with dead body reaction sorting separately from the other five items. We had 11 independent change scores for before minus after cadaver dissection (all measures listed in Table 1 except the total disgust scale score, which is composed of the four subscale scores). To determine what changes were related to what other changes, we calculated a change (before minus after) score for each of the eleven variables, and entered these scores into a principal component factor analysis, with a Varimax rotation. The result revealed three clear change factors. All of the medical procedures (splinter, blood, and anesthesia) sorted into a first factor (explaining 35% of the variance), the four disgust subscales sorted into a second factor (explaining 18% of the variance) and the changes in reaction to the two dead bodies formed a the third factor (explaining 15% of the variance). It is notable that the

two measures that changed significantly after the cadaver dissection, death-envelope disgust, and touching a preserved dead body, sorted on to different factors. However, examination of the rotated factor loadings reveals that although the disgust body envelope death score loaded .59 on the second disgust factor, it also loaded .41 on the third dead body factor. This was the only score that did not load definitively on one factor, so there is a substantial link between change in death-body-envelope violation disgust and change in touching a dead-preserved body ( $r=.34$ ).

## 4 Discussion

We report significant drops in sensitivity to touching cold dead bodies (but not warm bodies) and only in disgust sensitivity to death/body-envelope violations after dissecting a cadaver. We conclude from these findings that extensive exposure to preserved dead bodies, and the dissection of these, produces disgust adaptation in a rather specific domain. Further research would be needed to see if what we report is a general principle, with respect to other disgust categories, as well as categories of elicitors of other emotions. It is our hypothesis that our findings will be similar to findings in other domains. From an adaptive point of view, learning about the innocuousness of a specific subclass of disgust or fear elicitors is probably not that informative about the safety of many other categories of elicitors of the same emotion.

There is supporting evidence for the specificity of “adaptation” from the literature on therapy for phobias. Most relevant, are two studies of treatment for spider phobics, since spider phobia has been shown to have a disgust component. DeJong, Andrea and Muris (1997) treated spider phobics with eye movement desensitization therapy. Both disgust and fear responses to spiders were reduced after therapy. They administered an early disgust/contamination scale (Rozin, Fallon & Mandell, 1984) which focuses on food and contamination, and for this scale, which includes no items about spiders, they found no change in sensitivity after the therapy, although they did report that the spider phobics, before therapy, showed disgust/contamination sensitivity that was higher than normal. Smits, Telch & Randall (2002) reported similar findings based on thirty minutes graded exposure to an actual spider, with a significant reduction in a scale measuring disgust to spiders, but no significant reduction in the same disgust scale (Rozin, Fallon & Mandell, 1984) used in the prior study. These findings are probably in keeping with more general findings on the specificity of fear reduction in cognitive-behavioral therapy.

The findings reported here take a place in the general study of hedonic adaptation (Frederick and Loewenstein,

1999). As Frederick and Loewenstein (1999) point out, adaptation occurs in some domains and not others, although there is no principle that predicts where adaptation occurs. Furthermore, we do not yet understand what determines the degree of generalization of adaptation to specific events, although there are principles from the psychology of learning which would suggest hypotheses.

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