

VARIABILITY IN THE INNATE BEHAVIOR OF DISGUST: A BRIEF REVIEW

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ABSTRACT

Disgust is a feeling of revolt or rejection of something at an emotional level. It has been debated over the past century whether this feeling of disgust is innate or not. Inherited behaviors are often described as being distinct from those behaviors that we acquire through experience. A large majority of evolutionary biologists describe this primitive behavior of disgust as being innate. It must be stated that these innate behaviors are in some aspect modified by the environment we live in. A review of disgust patterns will help us better describe the approach to some gastrointestinal infections. Patterns of disgust shown by different individuals, certainly, are distinct from each other. This is because the disgust systems of different individuals react discretely to certain stimuli and these systems evolve over the life of an individual. It is clear that disgust sensitivities vary among people and much evidence suggests that present theories are not particularly accurate in describing the variability in this so-called innate behavior. Therefore, we cannot label a pattern as being strictly innate or not innate. Some features or elements of every emotional pattern, including disgust, are innate, and some are not. These intricacies need to be explored by further research as this may help us approach some gastrointestinal infections in a way that addresses the root cause.

Keywords: Disgust, behavior, infection

INTRODUCTION

Disgust is a feeling of revolt or rejection of something on an emotional level. It has been debated over the past century whether this feeling of disgust is universal (implying some evolutionary basis) or not. Darwin (1) was the first one to suggest that this pattern is universal; however, not only Darwin but also renowned Professor Plutchik (2) describes disgust as one of the basic, primitive human instincts. Many studies support this idea of the universality of disgust (3, 4). Innate or instinctive behavior is a stereotyped, hereditarily determined characteristic of a species that is distinct from acquired behavior but open to evolutionary analysis, as described by Lorenz (5, 6).

Motivation for Studying Disgust

Disgust sensitivities vary across the world, and so do hygienic measures. The rate of gastrointestinal infections can be related to the gastronomic affairs of people from a certain place (1, 7, 8). This may help us better understand why some infections

occur more in certain regions. This will also help us approach the problem that addresses the root cause for a lot of gastrointestinal diseases, which as this research suggests, might lie somewhere in the problem of disgust.

The Nature of Innateness

First of all, it should be differentiated what makes a behavior instinctive. Inherited behaviors are often described as being distinct from those behaviors that are acquired through experience (9). It is necessary to elaborate on the question of which criterion we have to suggest whether a certain behavior pattern is innate or not. Do these innate patterns develop exclusively before birth? The answer is no. As described by Grohmann (10), there is post-natal maturation of these innate behaviors. Behaviors are too complex to be characterized under a single classification of being "innate" or "not innate", rather it must be said that behaviors have certain elements that are innate and certain elements that are not. One might say that



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innate behavior is something that develops without practice or influence of environmental factors (11). Or such behavior is displayed by individuals when they are raised in isolation. Quite a few such experiments have been conducted in which different animals have been isolated to study the innateness of their behaviors (12). It must be stated that these innate behaviors are in some aspect modified by the environment we live in. Some behaviors may be over-expressed, and some may be repressed, as suggested by a number of previous research studies (5, 11, 13). It is also necessary to ascertain the fact that labeling a pattern as being "innate" is mere wordplay, and it sheds no light on the developmental aspects of such behaviors. Most of the criteria for considering a pattern innate are arbitrary (14).

Innateness of Disgust

A large majority of evolutionary biologists describe the primitive behavior of disgust as being innate (1-3). They believe disgust to be an adaptive measure evolved to avoid diseases or parasite-contaminated food. They argue that disgust is a universal driver of pathogen avoidance behavior in humans (7, 8). We may agree with this idea, considering disgust is a major factor that is responsible for some people to eat specific meals (picky eaters). In most of the scenarios, the elicitors of disgust are implicated in the transmissibility of pathogens (9). It seems that the relationship between disgust stimuli and the corresponding disease sources is reasonably consistent throughout humanity (1, 7, 8).

People tend to avoid meals which had elicited disgust sometime in the past (8). A study that supposedly supports this idea of the innateness of disgust suggests that people frown when they are disgusted and have a specific pattern of facial movements that limit the extent to which the surface of the eye is exposed to pathogens (15). Some have suggested that this facial pattern is to increase the visual acuity so that the potential pathogenic substance can be better examined. This interpretation also supports the pathogen-avoiding behavior (16). Furthermore, the feeling of disgust makes a person avoid physical contact with the substance that elicits such a response (17). This suggests that our behavioral immune system depends on disgust to guide it (18).

It is suggested that disgust sensitivities are higher in areas where the rate of infectious diseases is higher. This is supported by a study that showed people living in an area with higher infection rates scored higher on disgust sensitivity compared with people living in an area with lower infection rates (19, 20). A study conducted by Tybur et al. (21) in 2016 measured disgust sensitivities in about 11,000 participants from 30 nations and provided similar results; i.e. higher disgust sensitivities in the individuals belonging to the nations with higher infection rates. Curtis et al. (22) conducted a study in which he found that disgust sensitivities (of pictures collected by him) did not vary across many nations. The sample size under question was more than 30,000 individuals. This result is striking because it

contradicts the results of previous research, but there is a way to reconcile them (21). It might be said that the people with lower disgust sensitivities that lived in high-infection areas developed more resistance to infectious stress rather than developing greater disgust sensitivities (23).

Variability in Disgust

Patterns of disgust shown by different individuals are distinct from each other. This is because disgust systems of different individuals react discretely to a certain stimulus, and these systems evolve and improve over the life of an individual (24, 25). A study was conducted globally where over 38,000 participants were asked to rate, on a Likert scale of 0-5, how disgusting a series of so-called disgusting pictures (including those of sick people, body fluids, and crowded trains) were to them. It yielded that people in different areas of the world showed a great degree of variability (mean standard deviation: 0.83) (21).

Trait-based Differences

It is known that individuals deviate in their behavioral patterns from each other because they have different traits as shown by the fact that obsessive compulsive disorder is often associated with too much disgust sensitivity (26). On the contrary, people with Huntington's disease show lesser disgust sensitivity (27). These trait-based differences are important factors for variation in disgust sensitivities. In addition, as described earlier in this review, people learn from their environments; they evolve and modulate their disgust sensitivities to better cope with the environment (11, 13).

Cultural Background

Culture is the pool of beliefs, customs, and traditions that has developed over time of a particular group of people in a particular area at a particular period (28). Disgust may be a product of a person's cultural background, thus showing environmental effects on human behaviors (13). A person's culture is thought to play a significant role in determining disgust sensitivities, even more so than heredity, which is discussed in more detail under the next heading (29).

Genetics and Learning

Some studies have shown that a person's disgust sensitivities depend heavily on their parent's disgust sensitivities (30-32). This is because the children observe and learn from their parents' behaviors (33, 34). Davey et al. (34) showed that parents and their children show similar scores on the disgust scale. This implies that genetics, along with the environment, has a significant effect on the disgust sensitivities of individuals. A study was conducted on a sample of 38 monozygotic twins and 34 dizygotic twins (29). Disgust scores of those monozygotic ones were similar to those of the dizygotic ones ($p < 0.05$) (29). This showed that heredity is not as statistically significant a factor as compared to environment or culture (29). Another study that tested 131 monozygotic twin pairs showed that about half of the disgust sensitivity variations were due to

genetics. These findings strengthened the view that genes are a major factor controlling disgust sensitivities (35).

CONCLUSION

As described earlier, the results of the study that measured disgust sensitivity in over 30,000 individuals showed that disgust sensitivities are very similar among people across the nine regions of the world (22). If disgust was an adaptive measure evolved to avoid parasitic infestations or infections, then the results of the experiment would have been completely different. Still, the possibility of this cannot be completely ruled out, as disgust does prevent one from eating unhygienic meals, as well as the contrasting results of Tybur et al.'s (21) study (22).

It is clear that disgust sensitivities vary among people, and much evidence suggests that the aforementioned theories are not particularly accurate to describe the variability in this so-called innate behavior.

So, what are the reasons behind disgust variability? It seems that the following factors can help to determine peoples' disgust sensitivities: Culture, trait-based variations, general hygiene behavior, genetics.

Some features or elements of every pattern including disgust are innate, and some are not innate. More intricacies need to be explored by further research on this pattern of disgust, keeping in mind the factors stated above.

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