

# Disgust and fear interactions: Joint effect of disgust triggering and agency detection.

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## Introduction

The emotion of disgust influences a variety of human behaviors and beliefs, some of which play an important role in religious context (rituals, magic, taboos etc.). While disgust has been intensively studied in the past two decades, its possible interaction with other basic emotions is mostly unknown. Disgust and fear are discrete emotional states characterized by different patterns of physiological reactivity and behavioral tendencies but in real life situations these emotions can occur together or enhance one another. Woody and Teachman propose a synergistic model of a bidirectional association between disgust and fear where they trigger or enhance one another (Woody & Teachman, 2000), which is of particular interest in this study.

Disgust eliciting stimuli used as items in disgust sensitivity scales or as experimental material (pictures, video clips, vignettes, guided imagination etc.) vary not just between different eliciting objects and substances, but also vary non-systematically from simple object observations to more complex situations involving actions and/or other individuals. For instance the broadly used Disgust Scale (Haidt, McCauley & Rozin, 1994), include items like "You see maggots on a piece of meat in an outdoor garbage pail" and "If I see someone vomit, it makes me sick to my stomach". The difference between these two is not just the difference between the kind of disgusting substances (rotting meat vs. vomit), but also vary from a passive object to an acting agent (e.g. a vomit vs. somebody is vomiting; rotting meat vs. somebody barehanded manipulating it). This study examines the role of agency in disgust stimuli as a possible link to fear co-triggering. An agent, whose properties elicit disgust, ought to enhance fear, because it is less predictable than a passive disgusting object. In such a situation, to guarantee the non-contact with the disgusting object, the behavioral manifestation of disgust, could be not sufficient and requires the rapidity of the flight response which is characteristic for fear. This study clarifies whether differences in the structure of disgust eliciting situations - regarding the presence/absence of other agents linked to the disgusting objects - can lead to increased fear reactions.

## Hypothesis

Muris et al. (2008) propose two scenarios for the causal role of disgust in the enhancement of fear. The first is that evoking disgust leads, through an increase of proneness to a negative interpretation, to higher levels of fear. Second it is the disgust-related properties of situations that increases fear in response stimulus that evokes disgust. Following these interpretations, it is here proposed that

- 1) disgust eliciting situations lead to an increase of fear relative to non disgusting situations,
- 2) situation with an agent based disgust stimuli increases fear relative to non-agent disgust situations.

## Participants

Two hundred seventy Masaryk University students participated (female 139, M = 21.85, SD=2.33) in exchange for credits. Students were recruited from a participant-pool course and came from diverse fields of study

## Procedure

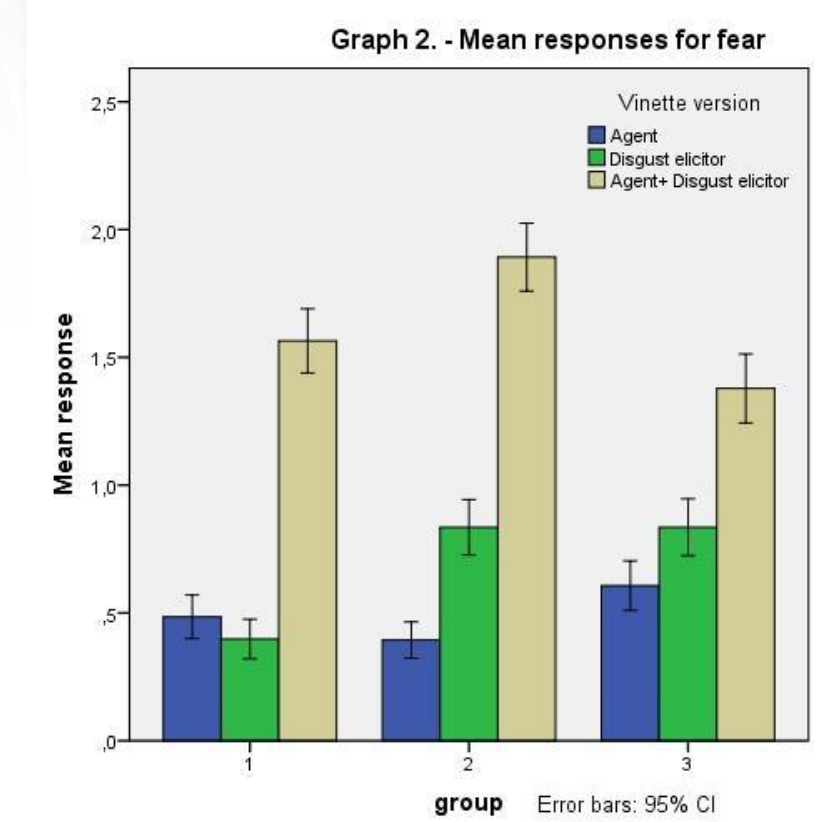
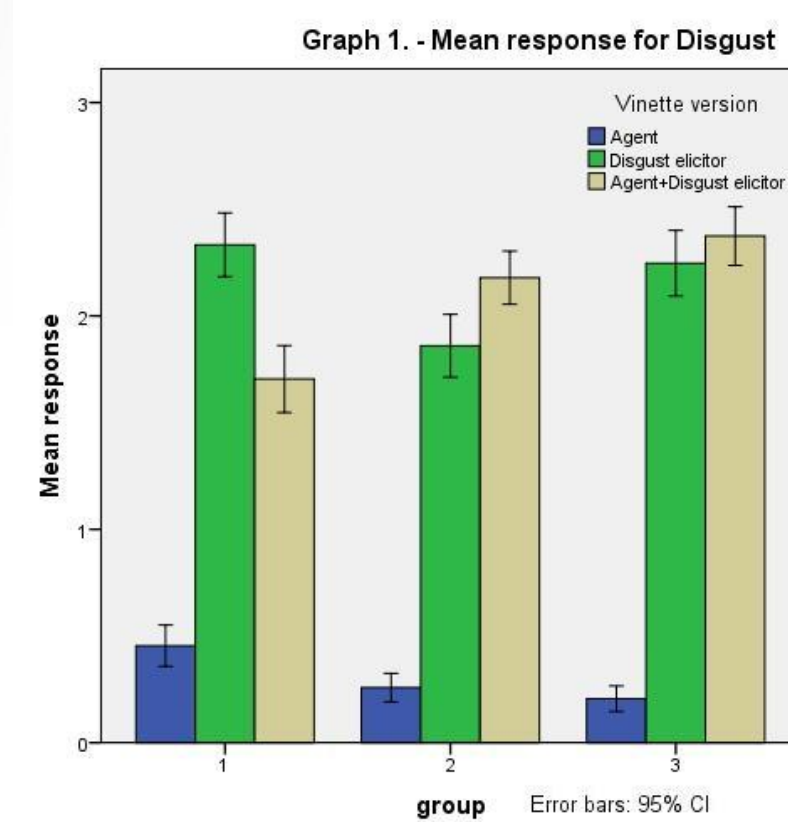
Participants read a sequence of 9 vignettes and were instructed to imagine themselves in the situation described and mark what they would feel with 5-point Likert-scales for disgust, fear, (from "not at all"(1) to "extremely"(5)).

Twenty seven vignettes were devised for this study, which depicted situations where individuals find themselves in proximity of various objects, but without any direct contact with them. The set consisted of 9 general situations, with 3 versions for each. This different version represented our experimental manipulation. Depending on the vignette version the object was either (1) an agent (human, animal), or (2) a disgust elicitor (vomit, entrails, blood, pus, rotting fish, insects, food leftovers), or (3) combination of both, where the agent was a carrier of the disgust elicitor (e.g. a man smeared with a vomit). Participants were divided into three groups with different sets of the 9 vignettes with one vignette for each general situation and 3 for each condition. The distribution of vignettes between the groups avoided the possibility that one participant could compare vignettes for one and the same general situation. For the distribution of vignette versions between groups see table 1.

After reading and rating vignettes, participants fill out a questionnaire measuring demographics and *Disgust scale-Revised* (DS-R, Olatunji et al., 2007). DS-R is a shortened version of the original *Disgust scale* (Haidt, McCauley & Rozin, 1994). DS-R is a 25 item scale. These scales include 13 true/false items and 12 items that are rated on a 3-point scale (0, .5, and 1) with regards to the extent to which participants find the experience "Not Disgusting At All, Slightly Disgusting, or Very Disgusting".

Table 1. Distribution of vignette versions between participant groups

	General situation									A 0 version with an agent D 0 version with a disgust elicitor AD 0 version with an agent which is a carrier of a disgust elicitor
	1	2	3	4	5	6	7	8	9	
Group 1	D	AD	A	D	AD	A	D	AD	A	
Group 2	A	D	AD	A	D	AD	A	D	AD	
Group 3	AD	A	D	AD	A	D	AD	A	D	



## Results

A total (sum) score for overall DS-R was computed as a overall disgust sensitivity. The internal consistency of DS-R was satisfactory ( $\alpha=.85$ , mean=10.51, SD=4.87, Range 0-21(0-25)).

Mean responses for fear and disgust are displayed in graphs 1 & 2. To investigate a relationship between vignette versions and emotional responses we used Cumulative link mixed model with R function `clmm` in the package `ordinal`. We took vignette version and DS-R effects to be fixed and the subject effects to be random. The model fitted with the adaptive Gauss-Hermite quadrature approximation with 9 quadrature points. The same model was used for each group and for fear and disgust responses. Table 1. shows the parameter estimates. Estimated coefficients with confidence intervals for vignette versions (with the *agent* version as a reference category) are visualized in Graph 3. Coefficients for *DisgustElicitor* and *Agent+DisgustElicitor* show that disgust response significantly increases in all three groups when vignettes involved disgust eliciting stimulus and for both categories (with and without an agent) disgust responses reached similar level. Also fear responses show significant increase (with exception for *DisgustElicitor* in Group 1,  $\beta = -0.319$ ,  $p=.098$ ), but also show an increasing trend between *DisgustElicitor* and *Agent+DisgustElicitor* vignette versions. Coefficients for DS-R show a significant positive relationship with disgust responses across groups but with fear responses only in group1.

These results support our hypotheses. While the increase of fear in *DisgustElicitor* versions can be explained by association between negative emotions, because fear increases with disgust, the increase of fear between *DisgustElicitor* and *Agent+DisgustElicitor* vignette versions can not be explained this way, because there is no comparable increase in disgust. This supports the idea that there is an functional link between disgust triggering and agency detection which leads to fear increase.

Table 1. parameter estimates for fixed effects

		$\beta$ coef.	s.e.	Wald z	p
<b>Group1</b>					
Disgust	Disgust elicitor	4.749	0.259	18.357	<.001
	Agent + Disgust elicitor	4.445	0.254	17.508	<.001
	DS-R	0.163	0.022	7.435	<.001
Fear	Disgust elicitor	-0.319	0.193	-1.655	=.098
	Agent + Disgust elicitor	2.639	0.200	13.180	<.001
	DS-R	0.115	0.024	4.879	<.001
<b>Group2</b>					
Disgust	Disgust elicitor	5.112	0.275	18.59	<.001
	Agent + Disgust elicitor	5.307	0.279	19.05	<.001
	DS-R	0.142	0.021	6.70	<.001
Fear	Disgust elicitor	1.168	0.179	6.523	<.001
	Agent + Disgust elic.	3.310	0.204	16.203	<.001
	DS-R	0.039	0.023	1.720	=.085
<b>Group3</b>					
Disgust	Disgust elic.	4.809	0.267	18.044	<.001
	Agent + Disgust elic.	5.045	0.272	18.542	<.001
	DS-R	0.152	0.019	7.633	<.001
Fear	Disgust elicitor	0.554	0.172	3.222	=.001
	Agent + Disgust elic.	1.632	0.176	9.253	<.001
	DS-R	0.027	0.026	1.02	=.306

Graph 3

