The en- and decoding of *schadenfreude* laughter

Sheer joy expressed by a Duchenne laugh or emotional blend with distinct morphological expression?

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***Abstract*—This study investigates the facial features of *schadenfreude* laughter in historic illustrations by applying the Facial Action Coding System and assesses the decoding by naïve subjects. Results show that while the encoding of *schadenfreude* laughter is heterogeneous, *schadenfreude* is decoded when the facial expression unites markers of joy (Duchenne Display, consisting of the orbicularis oculi pars orbitalis muscle and the zygomatic major muscle), as well as markers of negative emotions (e.g., brow lowering), or in one case, where the initially categorized *schadenfreude* illustration contained markers distorting the expression of joy (e.g., frowning and the lowering of lip corners). These findings support the hypothesis that *schadenfreude* may be expressed by a morphologically distinct blend of a positive and a negative emotion, or is expressed by joyful laughter (with the expression being modulated due to social desirability).**

Keywords: schadenfreude, Facial Action Coding System, Duchenne Display

I. INTRODUCTION

Schadenfreude is an emotion often aligned with the expression of laughter [1,2]. The term expresses the pleasure derived when the envied [3,4], unliked [5] or dismissed [6] person or group experiences a mishap or embarrassing situation. It is expected that the strength of the emotion is moderated by the subjective perception of gratification [4,6,7].

Ekman [8] considers *schadenfreude* as one of 16 enjoyable emotions, which are facets of joy and expressed facially by the Duchenne Display (e.g., enjoyment smile or laugh, DD; [9]). Other authors claim *schadenfreude* to be a blend of joy and anger or taunt [2,10] or "malicious pleasure" [11,12]. Although not all languages have a specific word for this emotion (e.g., English), the existence of this specific feeling state also occurs in English and Anglo-American approaches to emotion classifications [8][1]. While *schadenfreude* should go along with a distinct emotional experience, it is unclear, whether its expression morphologically differs from joyful laughter (e.g., D-laughter, see [13,14,15]).

Three facial expressive patterns are feasible: Firstly, *schadenfreude* may be expressed by a D-laugh, as to the target, it is sheer joy seeing the "enemy" or out-group suffering. Secondly, *schadenfreude* may be expressed by a DD, but as deriving pleasure from the misfortunes of others is not socially desired (at least in Western cultures, see [8]), it might be that the laugh is regulated (e.g., down-regulation, modulation, or masking). This might involve elements of smile controls (i.e., lower intensity lip corner retraction and less opening of the mouth), additional covering actions like looking away, hand on mouth, or adding salient voluntary actions that change the expression of joy in the mouth and eye region. Thirdly, if *schadenfreude* is an emotion blend of a positive and negative emotion, it might be expressed facially by a blend of joy with markers of negative emotions (e.g., taunt).

Research on auditory features of *schadenfreude* laughter has been undertaken [2], but no current research team investigates the facial features of *schadenfreude*. Yet a recent review of the historic literature [16] shows that authors of the 19th and early 20th century [17,18,19,20,21], have made numerous attempts at distinguishing different qualities of laughter, with *schadenfreude* laughter being one of four converging categories (next to joyful laughter, intense laughter, and grinning) for which visual illustrations as well as verbal descriptions exist. Therefore, this study examines the en- and decoding of facial expressions of *schadenfreude* laughter in historic illustrations to see whether knowledge of historic authors can be a starting point for research on facial features of *schadenfreude* laughter.

II. AIMS OF THE STUDY

The aims were twofold: firstly, all historic illustrations of types of laughter meeting a set of selection criteria (e.g., proposed laughter categories were available in visual illustration and verbal description and proposed by more than three illustrators; 18 illustrations in total; see Ruch, Hofmann, & Platt, under review) were coded by the Facial Action Coding System [22] by two independent certified coders to investigate the encoding of *schadenfreude* laughter (provided by Borée, Huter, and two illustrations by Rudolph). Secondly, the illustrations were presented in an online study to naive subjects (N = 87; 38 males; age M = 33.83, SD = 13.74; German-speaking background), which had to rate each illustration for their content of seven basic emotions (joy, anger, fear, sadness, surprise, disgust, contempt), as well as *schadenfreude*, shyness, maliciousness and friendliness on a five point answering scale.

[1] Words for *schadenfreude* are found outside the German language, e.g., in Chinese 幸灾乐祸, which means to gloat over someone else's misfortune or to take pleasure in others' misfortune (Pang, 2012; personal communication).

III. Results and Discussion

Results of the encoding study show that there was no convergence in the Action Units (AU) encoded in the four *schadenfreude* illustrations and none of the illustrations entailed a pure DD. In fact, a small aperture of the mouth seemed to be characteristic (indicating a less forceful laughter exhalation or a down-regulated intensity due to display rules) and also the eye region showed unequal, usually lower intensities compared to the AU12 (lip corner puller). Most frequently an AU2 (outer brow raiser) could be observed in the eye region, as well as AU15 (lip corner depressor), AU17 (chin raiser) or AU20 (lip stretcher) in the mouth region. These actions help counteracting the effects of the contraction of the zygomatic major and orbicularis oculi muscles, i.e., distorting the expression of joy. This, in conjunction with the low(ered) intensity might help giving the appearance of that one is not really enjoying the mishaps of others in an unmitigated way. While this is compatible with the view that *schadenfreude* is a facet of joy [8], but down-regulated (lowered intensity) and concealed (additional AUs) due to lower cultural acceptance (in the encoder), it is doubtful whether or not decoders will identify it as such.

Results of the decoding study show that the four illustrations of *schadenfreude* differed in the extent to which they were perceived as containing *schadenfreude* (F [3,252] = 21.21, $p < .001$). Borée's illustration was rated to contain most *schadenfreude,* differing from all other illustrations, which did not differ from each other. This variant involves an AU7 (lid tightener) in extreme intensity, an AU1 and AU2 (inner and outer brow raiser), a very small mouth aperture and unilateral AU15 (lip corner depressor). However, this was also the only illustration where *schadenfreude* was rated at least "slightly present". Therefore, it was informative to compare all illustrations that received a mean rating of 2.00 or higher in *schadenfreude*, irrespective of the initial category (2 joyful, 1 intense, 1 *schadenfreude*). While these four generally did not differ (F [3,249] = 1.93, n.s.), there were convergences in their facial features. Three consisted of an AU4 (and/or AU9; brow lowerer, nose wrinkler) in addition to AU6 (cheek raiser), AU7 (lid tightener), and AU12 (lip corner puller), and an open mouth (AU25, AU26, AU27), plus the above described variant by Borée (1899) with the AU1, AU2 and AU15.

Those results support the claim that *schadenfreude* displays might entail the facial expression of enjoyment with strong mouth opening, plus a sign of negative emotion (AU4, AU9). This is further supported by the correlations of the emotion ratings for the four illustrations with high *schadenfreude* scores: *schadenfreude* ratings were highly correlated to rated joy ($r = .21$, $p < .05$), maliciousness ($r = .62$, $p < .001$), as well as contempt ($r = .40$, $p < .001$). Borée's variant supports the hypothesis of *schadenfreude* laughter being joy modulated by voluntary actions: a tightening of the eyelids, raising of eyebrows with asymmetric action in outer eyebrow and lips corner repression in addition to an AU12.

To conclude, while the encoding of *schadenfreude* was heterogeneous, decoding was linked to the appearance of markers of negative motions, namely AU4 and AU9. Next steps include the induction of *schadenfreude* in participants and the investigation of video clips portraying *schadenfreude* laughter. Clips of *schadenfreude* laughter of individuals feeling unobserved are needed to see whether the expression of *schadenfreude* consists of a pure joy laughter (D-laugh) when individuals feel unobserved and no social desirability leads to regulatory actions, or whether the occurrence of AU4 and AU9 can be replicated. Furthermore, the existence of *schadenfreude* should be investigated in different cultures to verify the universality of this feeling state.

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