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Exhilaration, Exhilaratability and the Exhilarants

Willibald Ruch

Heinrich-Heine-University of Düsseldorf, Düsseldorf, Germany

The emotion of exhilaration, understood as a short-lived process of "making cheerful" or the temporary rising and fading out of a cheerful state (the term exhilaration used according to its Latin root, hilaris meaning cheerful), can be seen as a facet of happiness or joy. Using Wundt's dimensional system of emotion one can characterize exhilaration as relaxed, pleasurable excitement. Within the family of positive emotions exhilaration might be the one that relates most strongly to laughter. Indeed, historically the term "exhilaration" was used most often in the context of the study of laughter (e.g., Raulin, 1900). However, the usage of the term is not restricted to cheerful states of highest intensity but it is meant to cover the whole span from low (e.g., slight amusement at a mildly funny joke with no or only barely visible facial changes) to high intensity exhilaration (e.g., an outburst of laughter after inhaling nitrous oxide). While the usage of the term requires some modification of its everyday meaning, "exhilaration" was preferred to other terms used in the contemporary literature (e.g., amusement, mirth) as these bear other shortcomings (Ruch, 1990); for example, amusement also has unwanted connotations as it emphasizes an element of diversion.

Exhilaratability

A summary of what is known about exhilaration in the domain of experience, behavior and physiology was given previously (Ruch, 1990, 1993). Moreover, the outline of the concept also included the exhilarants (i.e., the stimuli and situations capable of inducing exhilaration) as well as the situative (e.g., social and physical) and actual and habitual organismic factors facilitating or inhibiting the induction of exhilaration. The significance of the latter was underscored by the results of a review of published experiments on smiling and laughter which suggested that between 5 and 39 percent of the subjects in did not respond at all (Ruch, 1990). While everyday experience tells that there are indeed people who overall laugh more and those who laugh less, the observed frequencies do also require the study of situative factors and the individual's actual readiness for the emotion. Thus, one has to acknowledge that the threshold for laughter and exhilaration varies inter- and intradividually and the study of exhilaration also should identify the different factors that contribute to an individual's degree of exhilaratability.

A state-trait model of cheerfulness

Initial studies of laughter propensity used the Eysenckian superfactor of Extraversion (Ruch, 1990; see also Ruch, 1997a) which was shown to be a predictor of positive affect (e.g., Larsen & Ketelaar, 1989). However, the analysis of subfactors of extraversion (for example the markers of extraversion in the 16PF) showed that only certain components of extraversion are potent predictors. Likewise, initial studies of mood and laughter suggested that exhilaration is better studied in the context of more specific constructs rather than the global concepts. In two experiments an index of cheerfulness (derived from a multidimensional mood adjective list) appeared to be a better predictor of facial exhilaration (assessed by means of FACS and facial-EMG)

than the more general scales of elation or positive affectivity. This suggested that it is best to tailor the concepts to the nature of the emotion: just as exhilaration is a facet of happiness or joy, it seemed more promising to select narrow mood and personality concepts from the respective segments of positive affectivity. This led into the concept of cheerfulness as a state and trait (Ruch, 1990). Thus, among other actual and habitual organismic variables (e.g., fatigue, susceptibility to certain stimuli), cheerfulness as a mood state and cheerfulness as a temperamental trait were both assigned prominent roles within this framework. Both should serve for controlling (i.e., predicting or explaining) individual differences in exhilaratability. Cheerful mood was seen to be the very state which facilitates exhilaration; i.e., it is supposed to represent a state of enhanced preparedness to respond to an appropriate stimulus with smiling and laughter. It was claimed that a concept of cheerfulness as an enduring disposition is also necessary, since individuals differ habitually in the frequency, intensity, and duration of cheerful mood states as well as in the ease with which exhilaration is induced. While state and trait cheerfulness were considered to form facilitating elements, for a more complete account of exhilaratability, a serious frame of mind and a prevalent bad mood as factors impairing the induction of the emotion were also considered. However, so far our research has concentrated on cheerfulness and the present report will also concentrate on this concept.

The State-Trait-Cheerfulness-Inventory (STCI)

The State-Trait-Cheerfulness-Inventory (STCI) was constructed to provide a reliable and valid assessment of cheerfulness, seriousness, and bad mood both as actual states and habitual traits. There is a component (or long) and standard form of the trait part (STCI-T) with 106 and 60 items, respectively. The construction was preceded by the study of the homogeneity of the 16 facets postulated to define the three concepts. The factor structure turned out to be comparable across the two nations studied and both the German and US versions have sufficient reliability. The standard form of the state part of the STCI (i.e., the STCI-S) measures state cheerfulness, seriousness, and bad mood with 10 items. Subscores for the facets (hilarity, cheerful mood, earnestness, pensiveness, soberness, sadness, and ill-humoredness) can be derived as well. The construction of the German and English state version included the study of both intra- and interindividual variation; also, we examined the sensitivity to reflect (experimentally manipulated or naturally occurring) changes in mood at the level of items and scales (Ruch 1997b; Ruch et al., 1997). Both scales utilize a four-point answer format. A joint factor analysis of the state and trait items yielded factors of cheerfulness, seriousness, and bad mood both as traits and states with the homologous concepts correlating positively. While the trait scores were relatively stable across the time interval of four weeks ($r_{tt} = .77$ to $.86$, $N = 103$), the test-retest correlation for the states were low ($.33$ to $.36$) as to be expected for transient mood states.

Cheerfulness as a disposition for exhilaration

Cheerfulness as a mood state or a more tonic change in mood and the emotion of exhilaration as a temporary rise in cheerful state are distinct but conceptually related. A cheerful mood is characterized by longer duration, less fluctuation in intensity, and greater independence from an eliciting stimulus. Single incidents of exhilaration are of

short duration and have a marked timing; typically, there is a more or less steep onset, a pronounced apex, and a generally less steep offset, all in all lasting a few seconds. It was hypothesized that there is a reciprocal relationship between exhilaration and the state of cheerfulness: a cheerful state facilitates the induction of exhilaration, and an accumulation of exhilaration responses may lead to longer-lasting changes in the level of cheerfulness.

Indeed, state cheerfulness turned out to be a moderator of the induction of exhilaration in several experiments and its effects were independent of the ones of trait cheerfulness. In a recent study ($N = 60$ female students), the experimenter was instructed to laugh or not laugh at certain preselected scenes while watching a movie. Experimenter's laughter facilitated enjoyment displays among individuals high in state cheerfulness but not among individuals low in cheerful mood (Ruch, 1997b). Likewise, cheerful mood moderated the effects of the "mere-presence" of a person on the frequency of facial indicators of exhilaration (Ruch, 1990). Zajonc (1965) argued that "mere-presence" of a conspecific increases the level of arousal, which, in turn, facilitates the dominant response and suppresses nondominant responses. While Chapman and collaborators (for a review see Chapman, 1983) verified that the mere presence of a person increases the rate of smiling and laughter in response to humor, I argued that the dominance of laughter as a response should be depending on the actual state. Indeed, the mere presence condition facilitated the induction of exhilaration among those in a cheerful mood, whereas there was no such effect for non state cheerful individuals ($N = 80$ female students). Furthermore, the relevance of cheerfulness was contingent on a minimal social situation; state cheerfulness turned out to be predictive of facial exhilaration only if another person was present in the room and had no predictive power during solitary situations (Ruch, 1990). Finally, those scoring high in STCI-S cheerfulness the laughed more on first seeing a funnily-dressed experimenter than those low in state cheerfulness (Ruch, 1997b).

Cheerful mood also seems to involve the propensity to smile and laugh at less potent stimuli. In two experiments "thresholds" were determined from the pattern of facial and verbal responses female subjects showed when watching slides with jokes and cartoons (Ruch, 1990). A 7 x 5 contingency table was derived for each research participant which listed the co-occurrence of facial response (no response = 0; x, y, z = three intensity levels of AU12, L = laughter) and verbal rating of funniness (0-6 = 7 steps of the scale).

Laughter			2	1
AU12z				
AU12y		1	1	1
AU12x		2		1
no response	7	10	2	2
	0	--1	--2	--3--4--5--6
		Funniness rating		

A "threshold" was defined as the minimal funniness level which was accompanied by a particular facial response. The response vector displayed above shows that the research participant did not show a scorable facial response at the 17 jokes and cartoons which she rated as not at all (=0) funny or mildly funny (1). Beginning with "2" she started display a smile (i.e., the action of the zygomatic major meeting the criteria for scoring an Action Unit 12 in the Facial Action Coding System by Ekman & Friesen, 1978), and beginning with "5" she did laugh, suggesting that the thresholds for smiling

and laughter of this woman are "2" and "5", respectively. Note that, as with other sorts of thresholds, at both threshold levels a response may or may not occur (Frijda, 1985). Thresholds were reliable over a period of 30 mins; rank order correlations (2 sets of 21 slides, $N = 80$ females) were 0.51, 0.63, and 0.60 for EMG-recordings in the eye, cheek, and mouth regions, respectively (Ruch, 1990). The threshold for smiling was lower for individuals in a cheerful mood tested under mere presence condition but higher when individuals were tested in solitude (Ruch, 1990, 1995). Some experiments also confirmed that subsequent mood level and changes in mood are depending on the degree of exhilaration induced: massed presence of exhilaration increased and the failure to find humor amusing reduced subsequent level of cheerful mood. However, the results obtained so far stem from correlational data and no experimental variation of the state was undertaken.

Also trait cheerfulness turned out to be predictive of exhilaration. In an experiment, 60 female students were involved in a 10-minute lasting facetious vs. neutral interaction with the experimenter. Individuals high in trait cheerfulness, as assessed by the STCI-T, displayed facial signs of exhilaration in higher frequency, intensity and duration than the low cheerful individuals did (Ruch, 1997b). Extraversion turned out to be less predictive. To avoid the confounding with the enjoyment of sociality, the amount of interaction was minimized in a second experiment where nitrous oxide ("laughing gas") was used as an exhilarant (Ruch & Stevens, 1995). Twenty male volunteers took part in two sessions one week apart in which they inhaled either a mixture of nitrous oxide and oxygen (4 trials) or pure oxygen (1 trial). Cheerful mood increased under nitrous oxide for trait cheerful individuals as compared to placebo (inhaling oxygen) and baseline measures ($p < .001$), which did not differ from each other (placebo control). No mood-enhancing effect could be observed for low trait cheerful individuals. Furthermore, the analysis of facial expression showed that trait cheerful individuals smiled and laughed more often ($M = .75$) than low trait cheerful individuals ($M = .31$), $t = 2.98$, $p = .01$ did. Again, the predictive validity of the general personality dimension of Extraversion was lower than the one of the more specific construct of trait cheerfulness: the frequency of enjoyment-displays correlated .54 ($p = .013$) with extraversion and .62 ($p = .003$, $d.f. = 18$) with cheerfulness; likewise, mean intensity of facial exhilaration correlated .34 (ns) with extraversion but .55 ($p = .0261$, $d.f. = 14$) with cheerfulness.

The validity of the concepts is considered to extend beyond the boundaries of research on laughter and exhilaration. For example, it was hypothesized that the tendency to keep or lose humor can be discussed as one element of the state-trait relationship; i.e., by the parameter of "robustness" of mood. It was postulated that the high trait cheerful person tends to maintain a high level of state cheerfulness (and retain a low level of state bad mood) in the presence of factors suiting to induce negative mood, while individuals low in trait cheerfulness more likely will "lose humor" (i.e., get grumpy and out of cheerful mood) when facing adversity (for empirical evidence see Ruch & Köhler, 1998).

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