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RESEARCH ARTICLE

Expressive Dissonance: When Emotional Inconsistency Arouses Dissonance

Audrey Pelt*, Laura Barbier* and Valérie Fointiat†

The aim of the two studies was to explore a new dissonance paradigm—expressive dissonance—based on the inconsistency between what people feel and what people express behaviorally. Expressive dissonance was aroused by asking participants to watch a film with a high emotional content, either positive (joy) or negative (sadness). In the no-dissonance condition, they received the instruction to naturally watch the film. In the expressive dissonance condition, they received the instruction to facially express emotions that were the opposite of what they felt. We expected that the expressive dissonance situation would: 1) require cognitive resources leading to a decrease in cognitive performance (studies 1 and 2); 2) be accompanied by emotional regulation strategies (study 1); 3) be accompanied by an increase in dissonance-related affects (study 2). Although our results (studies 1 and 2) corroborated those obtained previously in terms of performance, they also showed that participants in the expressive dissonance situation use emotional regulation strategies: exaggeration and suppression (study 1), and that they felt self-directed negative affects (study 2), just like the participants in a cognitive dissonance situation. These first results allowed us to establish a theoretical bridge between the theories of emotions—particularly those related to the emotional regulation processes—and to widen the scope of relevance of the dissonance theory.

Keywords: emotional inconsistency; emotional regulation; dissonance thermometer; emotional gap; cognitive dissonance

Cognitive dissonance theory (Festinger, 1957) is one of the key theories of social psychology. It can be presented in a few key points. Firstly, the presence in the cognitive universe of two inconsistent cognitions (Lawrence and Festinger, 1962) arouses a state of aversive tension, a state of psychological discomfort. Then, the greater the inconsistency, the greater is the dissonance. Finally, as this state is motivational in nature, as such it calls to be reduced. Festinger (1957) devised a tool for the theory of dissonance, allowing the extent of the dissonance to be quantified: the dissonance ratio given by the relationship of the inconsistent cognitions with all of the relevant cognitions, that is to say inconsistent and consistent.

Dissonance arousal can be induced by an attitude-behavior inconsistency (Aronson and Mills, 1959; Beauvois and Joule, 1996; Festinger and Carlsmith, 1959; Harmon-Jones and Harmon-Jones, 2002; McGregor, Newby-Clark, and Zanna, 1999). Research carried out on the paradigm of induced compliance (Festinger and Carlsmith, 1959) showed that after having behaved in a counter-attitudinal way in a context of freedom, participants modified their attitude in the direction of the behavior which had

induced the dissonance (e.g. Cohen, 1962). Even though a change of attitude is the most often studied mode of reduction, others nevertheless exist such as trivialization (Simon, Greenberg, and Brehm, 1995), denial of responsibility (Gosling, Denizeau, and Oberle, 2006), and rationalization in act (Beauvois, Joule, and Brunetti, 1993; Fointiat, 1998).

Dissonance can be aroused by an attitude-attitude inconsistency, with the free-choice paradigm (Brehm, 1966) being an illustration of this. Dissonance is aroused when an individual has to choose between at least two options: choosing option A to the detriment of option B means also accepting the disadvantages of A and depriving oneself of the advantages of B. Once the choice has been made, the individual reduces the dissonance by over-evaluating the option chosen and/or by under-evaluating the option rejected, illustrating the spreading of alternatives process.

Finally, dissonance can be aroused by a norm-behavior inconsistency (Priolo and Liégeois, 2008; Stone and Cooper, 2001). For example, the induced hypocrisy paradigm (Aronson, 1999; Aronson et al., 1991; Fointiat, 2004; Fointiat, Priolo, Saint-Bauzel, and Milhabet, 2013; Stone and Fernandez, 2008) is based on the combination of two factors: normative salience and the salience of past counter-normative behaviors. Here, dissonance is aroused by the discrepancy, which the individual perceives between

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what they know they have to do (the norm) and what they have not always done (counter-normative behaviors). Faced with the difficulty of changing the social norm or changing past behaviors, the dissonance is reduced by a behavioral change in the pro-normative direction.

Although dissonance can be aroused by an inconsistency between an attitude and a behavior, or between two attitudes, or between a behavior and a norm, a line of research has been established since the 1980s which explores emotional inconsistency and its effects in the field of organizational psychology.

Emotional labor and emotional dissonance

In the 1980s, organizations placed an emphasis on the quality of employee-customer relations, making emotions at work of central importance, in particular their links with health at work. Since the pioneering work of Hochschild (1983), many definitions of emotional labor have been found in the literature. Here we reiterate the one given by Morris and Feldman (1996) and adopted by Zapf (2002, p. 238): emotional labor is defined as the “effort, planning, and control needed to express organizationally desired emotions during interpersonal transactions”.

Emotional labor involves three components: surface acting, deep acting and emotional dissonance. The first two components refer to the emotional regulation process (Gross, 1998). Individuals who engage in surface acting will adjust the expression of their emotions to those expected by the organization and will hide non-expected emotions. In other words, the employee will work to hide their “real” feelings (emotional suppression) and rather express the expected emotions which they do not feel (emotional exaggeration, Grandey, 2000). Many studies have highlighted the fact that surface acting is positively correlated with emotional exhaustion and depersonalization (Brotheridge and Lee, 2002; Grandey, Foo, Groth, and Goodwin, 2012; Pisaniello, Winefield, and Delfabbro, 2012) and negatively correlated with accomplishment (Brotheridge and Lee, 2002; Pisaniello et al., 2012). An individual who engages in deep acting will adjust their internal feelings to the feelings expected by the organization. To achieve this objective, they can opt either for a cognitive change or for attentional deployment. In the first case, they will engage in a re-evaluation of the situation and alter their perception of it in order to trigger the emotion required by the situation. In the second case, they will draw on thoughts and events in their memory, referring them to the required emotion in the current situation (Grandey, 2000). So deep acting leads to an authentic expression of the required emotion and is based on a change of the emotion, which the individual felt in order to meet the expectations of the situation.

The third component of emotional labor, emotional dissonance, reflects an emotional state, and, unlike the two previous components, does not refer to emotional regulation processes (Hülshager and Schewe, 2011). Some authors defined emotional dissonance as an incongruence (Zapf and Holz, 2006) or a state of tension (Côté, 2005; Van Dijk and Brown, 2006) between emotions felt and expected. The emotional dissonance comes from an open

or latent conflict between emotions felt and expected in the context. Finally, for other authors (Hülshager and Schewe, 2011), emotional dissonance is thought to relate to a role conflict, which arouses an aversive state of tension. This conflict is thought to be aroused by the impossibility of expressing the emotion in the context at the same time as the impossibility of expressing the expected emotion, with the danger of challenging one’s self-integrity. Studies on emotional dissonance have shown that it is positively correlated with emotional exhaustion and depersonalization and negatively correlated with personal accomplishment (Wegge, Van Dick, and von Bernstorff, 2010).

The research carried out has adopted a correlational approach, in which emotional dissonance is measured with items such as “the emotions that I feel in my job do not correspond to these I would like to feel” or “the emotions I show in order to be professional are not in line with my inner feelings” (Andela, Truchot, and Borteyrou, 2015). In other words, authors focus more on the links between emotional dissonance and health or well-being than on the modes of reduction. Thus, the definition of emotional dissonance bears similarities with cognitive dissonance processes (Andela et al., 2015).

To our knowledge, only one study adopting an experimental approach has investigated the physiological and cognitive effects of emotional inconsistency (Robinson and Demaree, 2007). In this case, the emotional conflict was induced experimentally by arousing a negative emotion and by asking individuals to express the emotion opposite to that which they felt.

Expressive dissonance

Without referring to dissonance—cognitive or emotional—Robinson and Demaree (2007) based their study on the model of emotional regulation (Gross, 1998), which identifies two strategies of emotional regulation: one focused on the antecedents of the response (antecedent-focused strategy), while the other focused on the response (response-focused strategy) which operates when the emotion has already been provoked. In the latter case, emotions are managed by the suppression of the emotions felt and by the exaggeration of the emotions expected in the context.

Robinson and Demaree (2007) presented their study as an extension of research on emotional regulation evaluating the physiological and cognitive effects of a new response-focused regulation strategy, which they called expressive dissonance. This refers to the fact of displaying facially (i.e. by mobilizing the facial muscles) the opposite of what one feels (e.g. smiling when you feel sad), and is reflected by physiological arousal (e.g. increase in electrogalvanic responses). In addition, based on earlier research on the effects of response-focused strategies on cognition (Richards and Gross, 1999, 2000), Robinson and Demaree (2007) expected that in a condition of expressive dissonance, participants’ cognitive performances would deteriorate. In their study, participants watched three short films, the first emotionally neutral, and the other two sad. The emotional films were preceded by a screen on which

appeared one of the two counterbalanced instructions for 10 seconds: “watch the clip as naturally as you can” (without expressive dissonance condition) versus “watch the clip and express the opposite emotion that you feel” (expressive dissonance condition). The authors recorded the physiological data (e.g. electro-galvanic responses) then the participants replied to 10 questions on each film (recall task). As expected, in the expressive dissonance condition, the researchers observed an increase in the level of physiological arousal demonstrating the effect of response-focused emotional regulation (emotional exaggeration and suppression), and a lower performance in the recall task. The authors interpreted the latter result with reference to the divided attention model (DePaulo, Blank, Swaim, and Hairfield, 1992; Ellis and Ashbrook, 1989): As emotional regulation draws on attentional and cognitive resources, participants in an expressive dissonance situation have fewer resources to allocate to the film they are watching.

Considered together, studies carried out on emotional dissonance and more recent ones on expressive dissonance display areas of convergence. For the upholders of both, the salience of an emotional inconsistency requires the implementation of response-focused emotional regulation processes: the suppression of “real” emotions and the exaggeration of the required emotions. For the former, emotional dissonance reflects a state of tension (Andela et al., 2015) and not a new emotional regulation strategy as is the case with the latter.

To summarize, it seems that we are faced with a new dissonance paradigm, based on emotional inconsistency. Asking an individual to express the opposite emotion to the one that has been experimentally induced triggers response-focused emotional regulation. As this regulation requires attentional resources, the cognitive performances of individuals in an expressive dissonance situation will be impaired (Ellis and Ashbrook, 1989). Studies 1 and 2 will aim to replicate this effect.

In addition, although expressive dissonance refers, like other forms of dissonance, to a state of tension or arousal, we expect that this arousal will be undifferentiated (Cooper and Fazio, 1984; Cooper, Fazio, and Rhodewalt, 1978; Martinie, Olive, Milland, Joule, and Capa, 2013). If this is the case, we expect to observe the processes of emotional suppression and exaggeration, whether the expressive dissonance is induced by a negative emotion, such as sadness in the study of Robinson and Demaree (2007) or by a positive emotion, for example joy. Studies 1 and 2 will consequently illustrate these two types of induction of expressive dissonance.

Next, we expect, in line with preceding results, that in a situation of expressive dissonance, the process of emotional regulation will involve not only physiological changes as before, but also self-reported measures of emotions. Study 1 will examine the phenomena of emotional suppression and exaggeration with regard to self-reported emotions.

Finally, if as we think, expressive dissonance is a motivational drive, it should be accompanied by affects specific to dissonance, evaluated via the dissonance thermometer

(Elliot and Devine, 1994). Thus, study 2 will examine to what extent individuals in an expressive dissonance situation will experience psychological discomfort and self-directed negative affects.

The two studies are inspired by the experimental procedure of Robinson and Demaree (2007). The participants watched two film extracts. The extracts were always presented in the same order: a neutral film, then the experimental film presenting either a positive emotion (joy) or a negative emotion (sadness). Before watching the second extract, an instruction was displayed on the screen for 10 seconds specifying the way in which the participants had to watch the video: spontaneously (without expressive dissonance condition) versus expressing the emotion opposite to that which they would feel (expressive dissonance condition). Finally, the participants completed an emotions’ scale (study 1) or a measure of dissonance-related affects (study 2), then completed an information questionnaire on the experimental film (studies 1 and 2).

Study 1

In line with the work of Robinson and Demaree (2007), expressing an opposite emotion (joy) to that which is really felt (sadness) should lead to lower memory performances. We expected that participants who received the instruction to express joy facially while they were watching a sad film would remember less correct information about the sad film than those who watched the sad film naturally (preliminary hypothesis). Moreover, if, as we surmise, the effect of expressive dissonance is undifferentiated, we expect an effect of expressive dissonance when the film has a positive valence: The participants who expressed sadness facially would recall less correct information than those expressing joy (hypothesis 1). Based both on the earlier studies on emotional and expressive dissonance, and on the emotional regulation model (Gross, 1998), we expect participants in a condition of expressive dissonance to engage in emotional regulation strategies, regardless of the emotional valence of the film. We expect an effect of emotional suppression (hypothesis 2). When the emotional valence of the film is negative, participants in the expressive dissonance condition will declare that they feel less sad than the participants in the condition without expressive dissonance (i.e., suppression of sadness, hypothesis 2a). When the emotional valence of the film is positive, participants in the expressive dissonance condition will report that they feel less joyful than the participants in the condition without dissonance (i.e. suppression of joy, hypothesis 2b). Similarly, we expect an effect of emotional exaggeration (hypothesis 3). When the emotional valence of the film is negative, participants in the expressive dissonance condition will report that they feel more joyful than the participants in the condition without dissonance (i.e. exaggeration of joy, hypothesis 3a). When the emotional valence of the film is positive, participants in the expressive dissonance condition will report that they feel sadder than the participants in the condition without expressive dissonance (i.e. exaggeration of sadness, hypothesis 3b).

Method

Participants

Sixty-four students (32 women) from the University of Lorraine, aged between 17 and 32 years ($M = 21.05$; $SD = 2.572$) voluntarily took part in the study. They were assigned to one of four experimental conditions, with 16 participants per condition.

Experimental design and measures

Our research was conducted using a 2 (expressive dissonance: without vs. with) \times 2 (emotional valence: sadness vs. joy) between-subject design.

Pre-test of the emotional valence of the experimental films

Each experimental film lasted two minutes. The sad film was an extract from the film *Armageddon* (Bay, 1998); the joyful film was an outtakes compilation.

Twenty-eight participants indicated on a seven-point Likert scale how happy or sad they felt (from 1: extremely sad to 7: extremely joyful). As expected, watching the joyful film led the participants to feel more joyful ($M = 5.36$, $SD = .84$, 95% CI [5.03, 5.69]) than watching the sad film ($M = 3.14$, $SD = 0.94$, 95% CI [2.77, 3.51]; $t(26) = 6.53$, $p < 0.01$, *partial* $\eta^2 = .60$).

Measures

Information recall

To observe the effect of the induction of expressive dissonance on cognitive performance, we emulated Robinson and Demaree (2006) and included an information recall task. Each participant completed a questionnaire including ten open questions on the experimental film. A score was calculated by counting the correct responses.

Self-reported emotions

The participants replied to four items from Izard et al.'s emotions' scale (1993, translated from French by Ricard-St-Aubin et al., 2010), indicating on Likert-type five-point scales, from 1 (not at all) to 5 (completely) how sad (e.g. "do you feel unhappy?" and "do you feel sad and gloomy?", $r = 0.73$), or how happy they felt (e.g. "do you feel joyful?", "do you feel happy?", $r = 0.73$). As these items were strongly correlated, two indexes were constructed.

Procedure

As in the research of Robinson and Demaree (2007), the experiment was run individually. The experimenter was blind to the hypothesis. Participants were randomly assigned to one of the four experimental conditions. On their arrival at the laboratory, the experimenter welcomed the participants and explained to them that they were going to watch two short film extracts. The first two-minute extract was an emotionally neutral film, an extract from McLaren's *Lines Horizontal* (1960). Before the second extract, the experimenter warned them that an instruction would appear on the screen telling them how to watch the second film, which could be either sad (negative valence condition) or joyful (positive valence condition). In the condition without expressive dissonance, the instruction on the screen invited the participants to naturally watch the film: "You're going to watch a happy (vs. sad) film. Watch it carefully as if you were on your sofa in front of your television". In the expressive dissonance condition, the instruction on the screen invited them to watch the film while expressing facially the opposite emotion to the one they felt. The experimenter repeated each instruction orally, for example "You are going to watch a happy (vs. sad) film extract. I am asking you here to express the opposite emotion. Imagine that someone is watching you, they must have the impression that you are watching very sad (vs. very happy) film extracts". The instruction was only given 10 seconds before the beginning of the video extract so that the participants could experience the most accurate emotions possible (Demaree et al., 2006; Schmeichel et al., 2006). After watching the films, the participants completed the self-reported emotions scale and the information recall task on the experimental film. The subjects were then thanked, and debriefed.

Results

The results¹ for the information recall score and the self-reported measures of emotions of joy and sadness are presented in **Table 1**.

Information recall

In accordance with our preliminary hypothesis, we expected that the participants who had viewed a film with a negative valence would recall less correct information

Table 1: Mean scores (standard deviations) for information recall and the self-reported emotions of joy and sadness in accordance with the emotional valence of the video extracts (negative, positive) and expressive dissonance (without, with).

		Information recall	Joy	Sadness
Negative valence	Without Exp. Diss.	4.25 (1.80)	2.37 (0.95)	2.19 (1.20)
	With Exp. Diss.	2.81 (1.27)	2.41 (1.02)	1.50 (0.65)
Positive valence (joyful film)	Without Exp. Diss.	6.50 (2.28)	4.00 (0.63)	1.125 (.22)
	With Exp. Diss.	3.94 (1.43)	2.94 (1.34)	1.85 (1.19)

Note: Exp. Diss: Expressive Dissonance.

Information recall: the higher the means, the better is the information recall.

Joy and sadness: high scores indicate strong self-reported emotions.

in an expressive dissonance condition than in a condition without dissonance. A single-factor ANOVA revealed a significant difference between these two conditions (respectively, $M_{\text{dis.exp.}} = 2.81$, $SD = 1.27$, 95% CI [2.13, 3.49] and $M_{\text{without dis.exp.}} = 4.25$, $SD = 1.80$, 95% CI [3.29, 5.21], $F(1, 30) = 6.75$, $p = 0.014$, $\text{partial } \eta^2 = 0.18$). We are actually reproducing the effect observed by Robinson and Demaree (2007).

Our first hypothesis also predicted an effect of expressive dissonance when the participants watched a film with a positive valence. As previously, the data were analyzed with a single factor ANOVA. Indeed, participants in the expressive dissonance condition recalled significantly less correct information ($M_{\text{dis.exp.}} = 3.94$, $SD = 1.43$, 95% CI [3.17, 4.70]) than the participants in the condition without expressive dissonance ($M_{\text{without dis.exp.}} = 6.50$, $SD = 2.28$, 95% CI [5.28, 7.72]), $F(1, 30) = 14.46$, $p = 0.001$, $\text{partial } \eta^2 = 0.32$).

Self-reported emotions

The self-reported emotions were analyzed using an ANOVA with a 2 (expressive dissonance) \times 2 (emotional valence) between-subjects design.

Self-reported emotion of sadness

The analyses did not reveal significant main effects of the variables of expressive dissonance ($F(1, 60) < 1$, $p = 0.946$, $\text{partial } \eta^2 < 0.001$) and emotional valence ($F(1, 60) = 2.46$, $p = 0.12$, $\text{partial } \eta^2 = 0.04$). On the other hand, we observed a significant interaction effect between the two factors ($F(1, 60) = 9.38$, $p = 0.003$, $\text{partial } \eta^2 = 0.135$). Firstly, we observed a marginal effect of suppression of sadness (hypothesis 2a) when the emotional valence was negative ($F(1, 30) = 3.88$, $p = 0.055$, $\text{partial } \eta^2 = 0.12$). Participants in the expressive dissonance condition seemed to feel less sad ($M = 1.5$, $SD = 0.65$, 95% CI [1.15; 1.85]) than participants in the condition without expressive dissonance ($M = 2.19$, $SD = 1.21$, 95% CI [1.54, 2.83]). Then, in accordance with hypothesis 3b, in the positive valence condition (joyful film), participants in the expressive dissonance condition reported more sadness ($M = 1.85$, $SD = 1.19$, 95% CI [1.20, 2.48]) than participants in the condition without expressive dissonance ($M = 1.125$, $SD = 0.22$, 95% CI [1, 1.24], $F(1, 30) = 5.60$, $p = 0.025$, $\text{partial } \eta^2 = 0.15$).

Self-reported emotion: joy

Our results indicated a significant main effect of the expressive dissonance ($F(1, 60) = 4.09$, $p = 0.047$, $\text{partial } \eta^2 = 0.06$). Participants in the expressive dissonance condition reported less joy ($M = 2.67$, $SD = 1.20$, 95% CI [2.24, 3.10]) than participants in the condition without dissonance ($M = 3.19$, $SD = 1.15$, 95% CI [2.77, 3.60]). A significant main effect of emotional valence ($F(1, 60) = 17.91$, $p < 0.001$, $\text{partial } \eta^2 = 0.23$) showed that participants who watched the film with a positive valence expressed more joy ($M = 3.47$, $SD = 1.64$, 95% CI [3.05, 3.88]) than the participants who watched the film with a negative valence ($M = 2.39$, $SD = 0.97$, 95% CI [2.04, 2.74]). Moreover, a significant interaction effect was observed

($F(1, 60) = 4.61$, $p = 0.036$, $\text{partial } \eta^2 = 0.07$). In accordance with hypothesis 2b, we observed a suppression effect: The participants exposed to a film with a positive valence reported less joy in the expressive dissonance condition ($M = 2.94$, $SD = 1.34$, 95% CI [2.22, 3.65]) than those in the condition without expressive dissonance ($M = 4.00$, $SD = 0.63$, 95% CI [3.66, 4.33], $F(1, 30) = 8.22$, $p = 0.007$, $\text{partial } \eta^2 = 0.215$). On the other hand, hypothesis 3a was not validated. We did not observe the expected effect of exaggeration of joy: The participants who watched a film with a negative valence did not report more joy in a situation of expressive dissonance than those in a situation without dissonance (respectively $M_{\text{dis.exp.}} = 2.41$, $SD = 1.02$, 95% CI [1.86, 2.95] vs. $M_{\text{without dis.exp.}} = 2.37$, $SD = .95$, 95% CI [1.86, 2.88], $F(1, 30) = 0.008$, $p = 0.92$, $\text{partial } \eta^2 = 0.00$).

Discussion

With regard to information recall, the results obtained not only replicated those of Demaree and Robinson (2007), but also expanded them. In fact, as expected, the induction of expressive dissonance via the film with a negative valence led to a lower cognitive performance: Participants who watched the sad film with the instructions to express joy recalled less correct information than those who naturally watched it. In addition, this effect of expressive dissonance was also observed when the dissonance was aroused via the film with a positive valence: The participants who watched a joyful film with the instructions to express sadness recalled less correct information than those who naturally watched it. This result leads us to consider that the process of arousing expressive dissonance is based on the inconsistency between the emotion felt and the emotion expressed, independently of the valence of the emotion induced by the film. In other words, considered together, our results seem to argue in favor of an undifferentiated arousal of expressive dissonance.

In line with the work of Gross (1998) on response-focused strategies of emotional regulation, we formulated two hypotheses, one in terms of emotional suppression (hypothesis 2) and the other in terms of emotional exaggeration (hypothesis 3). Overall, our results supported hypothesis 2. In fact, we observed a strategy of emotional suppression, whether the expressive dissonance was induced by a film with a positive valence (hypothesis 2b) or a negative one (hypothesis 2a), even if in the latter case, the effect was close to significance ($p = 0.055$). They also partially supported hypothesis 3: Although the expected effect of emotional exaggeration was observed when the expressive dissonance was induced by a film with a positive valence (hypothesis 3b), this effect was not observed when the dissonance was induced by the film with a negative valence (hypothesis 3a).

It seems important to highlight the fact that the participants used emotional regulation strategies when they were in a situation of expressive dissonance. It seems that even in a situation of expressive dissonance induced by a positive emotion, the participants used two strategies concurrently: They expressed joy while increasing sadness. However, the induction of expressive dissonance by a negative emotion seemed to lead to a tendency towards

using the strategy of emotional suppression (although conventional levels of significance were not reached), but not to emotional exaggeration. Participants seemed to report less sadness without exaggerating joy.

If, as we surmise, expressive dissonance is based on a dynamic close to that of cognitive dissonance, this motivational tension should be accompanied by specific affects. To test this hypothesis, we used the dissonance thermometer (Elliott and Devine, 1994), a measure of self-reported affects characterizing the cognitive dissonance. Many studies on cognitive dissonance have used it, both with the induced compliance paradigm (Devine, Tauer, Barron, Elliott, and Vance, 1999; Gosling et al., 2006) and the induced hypocrisy paradigm (Fointiat et al., 2013; Pelt and Fointiat, 2017; Priolo et al., 2016).

Study 2

As in Study 1, we first of all aim to replicate the effects of expressive dissonance on cognitive performance. We expected better information recall in the condition without expressive dissonance than in expressive dissonance condition, regardless of the emotional valence of the film (hypothesis 1).

We next tested the hypothesis according to the arousal of expressive dissonance which is accompanied by affects associated with the arousal of cognitive dissonance (hypothesis 2). We expected participants in the expressive dissonance condition to experience more psychological discomfort (hypothesis 2a) and negative self-directed affects (hypothesis 2b) than those in the condition without expressive dissonance.

Method

Participants

Eighty students (including 40 women) between 17 and 48 years of age ($M = 22.49$, $SD = 4.51$) from the University of Lorraine were volunteers for this study. They were assigned to one of the four experimental conditions, with twenty participants (10 men and 10 women) per condition.

Experimental design and measures

Our research was conducted using a mixed design with expressive dissonance (without vs. with) and emotional valence (positive vs. negative) as between-subject factors and time of measure as within-subject factor (before vs. after the film).

Pre-test of the emotional valence of the film

Two extracts during 2 minutes were selected: Louis Malle's "Au revoir les enfants" (1987) and an outtakes compilation. As expected, on a Likert-type seven-point scale (from 1 "extremely sad" to 7 "extremely happy"), the participants who watched the joyful film reported more happiness than those watching the sad film (respectively, $M_{\text{joyful extract}} = 6.40$, $SD = .55$, 95% CI [6, 6.80] et $M_{\text{sad extract}} = 2.60$, $SD = 0.55$, 95% CI [2.20, 3], $t(8) = 10.97$, $p < 0.01$).

Measures

Information recall

The participants responded to eight open questions on the film (e.g., "how many children were taken by the soldiers?"). An information recall score was calculated by allocating one point to each correct response.

Dissonance thermometer

In accordance with the recommendations of Elliott and Devine (1994), we measured the four dimensions of affect: negative self-directed affects, or NegSelf (e.g., disappointed in myself, disgusted with myself), psychological discomfort (e.g. uncomfortable, bothered), anxiety (e.g., stressed, worried, anxious), and positive affects (e.g., content, happy). In line with the work of Lecricque (2007), the participants indicated for each of the twenty adjectives what they felt at that moment (also adapted from Matz and Wood, 2005) on a scale of 1: does not correspond to what I feel, to 7: completely corresponds to what I feel.

Procedure

The procedure used was similar to that of our first study. The experimenter was blind to the hypothesis. The experiment was run individually and participants were randomly assigned to one of four experimental conditions. On their arrival at the laboratory, the experimenter explained how the experiment would proceed. Then, the participants watched the first neutral extract (an extract from the film "Lines Horizontal", McLaren, 1960). Then, for half of them, an instruction to be emotionally inconsistent was displayed on the screen before the sad or happy film (expressive dissonance condition); for the other half, an instruction inviting them to watch the sad or happy film in the most natural way possible was displayed (condition without expressive dissonance). Each participant also completed the dissonance thermometer twice (Elliott and Devine, 1994): before (T1) and after (T2) the film. Then, each participant completed a questionnaire on the sad or happy film (information recall task).

Results

Preliminary results concerning the dissonance thermometer

A factor analysis (principal component analysis with oblique rotation, $\delta = 0$) conducted on the 20 items of the measure of affects produced a three-factor solution,² explaining 71.01% of variance. The first factor was made up of the items "disgusted with myself", "guilty", "disappointed with myself", "discontented", "angry at myself", and shame (respective scores 0.89, 0.87, 0.83, 0.80, 0.79, 0.68, $\alpha = 0.91$). This first factor explained 51.73% of variance and referred to the dimension of NegSelf identified by Elliott and Devine (1994). The second factor explained 11.33% of the total variance and included the items "uncomfortable", "embarrassed", "uneasy", "troubled" and "bothered" (respective scores 0.88, 0.83, 0.76, 0.76, 0.71, $\alpha = 0.91$). This second factor referred to the dimension of psychological discomfort, frequently identified in cognitive dissonance research (Fointiat et al., 2013;

Gosling et al., 2006; Priolo et al., 2016). Finally, the third factor referring to the dimension of the positive self only explained 7.95% of the variance and was made up of the items “content”, “happy”, “satisfied”, “energetic” (respective scores 0.93, 0.85, 0.78, 0.78, $\alpha = 0.91$). The results of this factor analysis led us to construct a Negself index and a psychological discomfort index.

Main results

The results for the information recall score, psychological discomfort and negative affects directed at the self are presented in **Table 2**.

Information recall

The data were analyzed using a 2 (expressive dissonance: with vs. without) \times 2 (emotional valence: positive vs. negative) ANOVA. As expected, the participants in the expressive dissonance condition reported less correct information ($M = 3.35$, $SD = 1.51$, 95% CI [2.87, 3.83]) than the participants in the condition without expressive dissonance ($M = 4.10$, $SD = 1.76$, 95% CI [3.54, 4.66], $F(1, 76) = 4.53$, $p = 0.03$, *partial* $\eta^2 = 0.06$). On the other hand, we observed no main effect of the emotional valence variable ($F(1, 76) = 1.63$, $p = 0.205$, *partial* $\eta^2 = 0.02$).

Finally, we observed a significant interaction effect between our two variables ($F(1, 76) = 7.27$, $p = 0.009$, *partial* $\eta^2 = 0.09$). The exploration of this interaction effect showed a simple effect of emotional valence in conditions without expressive dissonance. So, participants in the negative valence condition recalled more correct information than those in the positive valence condition, respectively: $M_{\text{neg. val.}} = 4.80$ ($SD = 1.50$, 95% CI [4.09, 5.51]) and $M_{\text{pos. val.}} = 3.40$ ($SD = 1.75$, 95% CI [2.58, 4.22], $t(38) = 2.81$, $p = 0.006$). The effect of the emotional valence of the film was no longer observed when the participants were in a situation of expressive dissonance, respectively: $M_{\text{neg. val.}} = 3.10$, $SD = 1.61$, 95% CI [2.34, 3.86] and $M_{\text{pos. val.}} = 3.60$, $SD = 1.39$, 95% CI [2.95, 4.25], $t(38) = 1.00$, $p = 0.31$.

Considered together, these results confirm hypothesis 1. Indeed, in a situation of expressive dissonance, participants

recalled significantly less correct information than those in conditions without expressive dissonance, whether the emotional valence of the film was negative or positive.

Measure of affects: psychological discomfort and Negself

Psychological discomfort and NegSelf were analyzed with a three-factor mixed design ANOVA including the factors expressive dissonance and emotional valence as between-subject variables and time of measure of affects as within subject variable.

Psychological Discomfort

Firstly, we checked that before induction of expressive dissonance, all participants reported comparable scores of psychological discomfort. In fact, a single factor ANOVA did not indicate any significant difference between our four experimental conditions, $F(3, 76) = 0.60$, $p = 0.61$, *partial* $\eta^2 = 0.02$.

We then observed a main effect of the time of measure of affects. The participants reported more psychological discomfort overall in time T2 than in time T1, respectively: $M_{T2} = 2.86$, ($SD = 1.55$, 95% CI [2.54, 3.19]) versus $M_{T1} = 2.28$ ($SD = 1.14$, 95% CI [2.03, 2.53]), $F(1, 76) = 11.57$, $p = 0.001$, *partial* $\eta^2 = 0.132$. On the other hand, we did not observe any significant main effects of the expressive dissonance ($F(1, 76) = 2.27$, $p = 0.136$, *partial* $\eta^2 = 0.03$) and emotional valence factors ($F(1, 76) = 3.75$, $p = 0.06$, *partial* $\eta^2 = 0.05$).

We also observed an interaction between the factors time of measure and emotional valence, $F(1, 76) = 11.33$, $p = 0.001$, *partial* $\eta^2 = 0.12$. The exploration of the interaction in time T1 did not show any difference between the conditions of negative and positive emotional valence, respectively, $M_{\text{neg. val.}} = 2.225$ ($SD = 1.13$, 95% CI [1.87, 2.57]) and $M_{\text{pos. val.}} = 2.33$ ($SD = 1.10$, 95% CI [1.98, 2.69], $F(1, 76) = 0.20$, $p = 0.65$, *partial* $\eta^2 = 0.002$). On the other hand, in time T2, the participants who had watched a film with a negative emotional valence reported significantly more psychological discomfort than those who had watched

Table 2: Mean scores (standard deviations) for information recall and measures of affect: psychological discomfort and self-directed negative affects directed, according to the emotional valence of the video extracts (negative, positive) and expressive dissonance (without, with).

		Information recall	Psychological Discomfort		Negative affects directed at the self	
			T1	T2	T1	T2
Neg. emo. val.	Without Exp. Diss.	4.80 (1.50)	2.04 (0.92)	3.24 (1.37)	1.48 (0.63)	1.71 (0.84)
	With Exp. Diss.	3.10 (1.61)	2.413 (1.30)	3.55 (1.68)	1.43 (0.80)	2.10 (1.20)
Pos. emo. val.	Without Exp. Diss.	3.40 (1.75)	2.21 (1.19)	1.94 (1.41)	1.41 (1.33)	1.39 (1.33)
	With Exp. Diss.	3.60 (1.39)	2.46 (1.02)	2.75 (1.32)	1.50 (0.97)	1.91 (1.09)

Note: N = 20 per cell. Exp. Diss: Expressive dissonance; Neg. emo. val.: negative emotional valence; pos. emo. val: positive emotional valence.

Information recall: the higher the means, the better is the information recall.

Psychological discomfort: the higher the means, the stronger is the psychological discomfort.

Negative affects: the higher the means, the greater are the negative affects.

a film with a positive emotional valence, respectively: $M_{\text{neg. val.}} = 3.39$ ($SD = 1.52$, 95% CI [2.93, 3.85]) and $M_{\text{pos. val.}} = 2.34$ ($SD = 1.41$, 95% CI [1.88, 2.80], $F(1, 76) = 10.40$, $p = 0.002$, $\text{partial } \eta^2 = 0.12$).

On the other hand, the interaction between the factors time of measure and expressive dissonance was not significant, $F(1, 76) = 0.52$, $p = 0.47$. So, hypothesis 2a was not validated.

Finally, our results did not show any significant interaction between expressive dissonance and emotional valence ($F(1, 76) = 0.18$, $p = 0.67$, $\text{partial } \eta^2 = 0.002$), nor of a second-order interaction effect between our three factors ($F(1, 76) = 0.36$, $p = 0.55$, $\text{partial } \eta^2 = 0.005$).

Considered together, our results for psychological discomfort suggested that this specific affect was more sensitive to the emotional induction of the film (negative valence) than to the induction of expressive dissonance.

Self-directed negative affects (Negself)

Firstly, we checked that during time T1, all the participants presented a comparable level of affects directed at the self. In fact, a single factor ANOVA did not show any difference between the four conditions in time T1, $F(3, 76) = 0.03$, $p = 0.99$, $\text{partial } \eta^2 = 0.001$.

Next, our results indicated a main effect of the time of measure of affects, $F(1, 76) = 14.27$, $p < 0.001$, $\text{partial } \eta^2 = 0.16$. Participants reported less Negself before the film (time T1) than after (time T2), respectively, $M_{T1} = 1.46$ ($SD = .95$, 95% CI [1.248, 1.672]) versus $M_{T2} = 1.77$ ($SD = 1.14$, 95% CI [1.52, 2.03]). On the other hand, the results did not indicate any significant main effects of the expressive dissonance ($F(1, 76) = 1.17$, $p = 0.28$, $\text{partial } \eta^2 = 0.015$) and emotional valence factors ($F(1, 76) = 0.31$, $p = 0.58$, $\text{partial } \eta^2 = 0.004$).

We also observed an interaction between the factors time of measure and expressive dissonance, $F(1, 76) = 6.72$, $p = 0.011$, $\text{partial } \eta^2 = 0.08$. The exploration of this interaction effect showed a simple effect of time of measure for the participants in the expressive dissonance condition. In accordance with hypothesis 2b, the participants who had expressed an inconsistent emotion with the one they were feeling (expressive dissonance condition) reported a NegSelf score that was higher in time T2 than in time T1, respectively $M_{T2} = 2.00$ ($SD = 1.14$, IC 95% [1.64, 2.37]) versus $M_{T1} = 1.47$ ($SD = 0.88$, 95% CI [1.18, 1.75], $t(39) = -3.66$, $p = 0.001$). On the other hand, in the conditions without expressive dissonance, we did not observe any simple effect of the time of measure: the NegSelf scores reported in T1 did not differ from those reported in T2, respectively, $M_{T1} = 1.45$ ($SD = 1.03$, 95% CI [1.12, 1.77]) versus $M_{T2} = 1.55$, ($SD = 1.11$, 95% CI [1.19, 1.90], $t(39) = -1.19$, $p = 0.23$).

Finally, we did not observe any significant interaction effect between the time and emotional valence factors ($F(1, 76) = 2.26$, $p = 0.137$, $\text{partial } \eta^2 = 0.03$) nor between the expressive dissonance and valence factors ($F(1, 76) = 0.09$, $p = 0.75$, $\text{partial } \eta^2 = 0.001$). The second order effect between the three factors was not significant ($F(1, 76) < 1$, $p = 0.98$, $\text{partial } \eta^2 = 0.00$).

Discussion

Firstly, studies 1 and 2 confirm the results of Robinson and Demaree (2007), namely lower cognitive performance in an expressive dissonance situation. This decrease could be interpreted in reference to the model of divided attention (DePaulo, Blank, Swaim, and Hairfield, 1992; Ellis and Ashbrook, 1989). Emotional inconsistency is thought to lead participants to engage in emotional regulation strategies, drawing on their attentional and cognitive resources. Robinson and Demaree (2007) had already demonstrated this effect when the valence of the inducing emotion was negative (i.e., sad film). Our results show that this effect was observed, even when the valence of the emotion was positive (i.e., happy film). In other words, it seems that it is emotional regulation following the arousal of an emotional inconsistency that mobilizes cognitive resources and not the valence of the emotion per se. Expressive dissonance appears to be an undifferentiated arousal. In our opinion, these first results provide indirect proof that expressive dissonance is not a matter of inconsistency between emotions (Zapf and Holz, 2006), but reflects an emotional conflict (Andela et al., 2014), which as such is subject to cognitive processing.

Next, the results of study 1 show that in an expressive dissonance situation participants used response-focused emotional regulation strategies (Gross, 1998). Although this effect on physiological indicators has already been demonstrated (e.g., electro-galvanic activity) by arousing expressive dissonance through the induction of a negative emotion (Robinson and Demaree, 2007), we reproduce it here for self-reported measures of emotions, whatever the inducing emotional valence (sadness vs. joy). A strategy of emotional suppression can be observed when expressive dissonance is induced by a negative emotion. On the other hand, when expressive dissonance is induced via a positive emotion, the participants use two strategies: suppression of the emotion felt, and exaggeration of the emotion required.

Concerning the dissonance thermometer in study 2, our results show that expressive dissonance is accompanied by specific affects and particularly, by Negself. Indeed, it seems as if the measure of psychological discomfort is more sensitive to the induction of negative emotions than to the arousal of an intrapsychic conflict. On the other hand, the Negself measure seems to be sensitive to the manipulation of expressive dissonance, whatever the positive or negative valence of the inducing emotion. The dissonance thermometer is usually used in the classic paradigms of cognitive dissonance: induced compliance (Elliot and Devine, 1994; Gosling et al., 2006) and induced hypocrisy (Fointiat et al., 2013; Pelt and Fointiat, 2017; Priolo et al., 2016). In the majority of studies, it is the dimension of psychological discomfort which reflects the arousal and the reduction of dissonance. In others, the Negself dimension seems to be sensitive to the arousal of dissonance (Gosling et al., 2006; Matz and Wood, 2005). In any event, the two indices are specific to the state of cognitive dissonance (Elliot and Devine, 1994).

Finally, measuring emotions of joy and sadness in a self-reported way can be a limitation. Indeed, we do not have any direct measure of the emotional state corresponding to the facial expression. This could be overcome, for example, by filming the participants and then analyzing the facial micro-expressions of emotion using the *FaceReader*. This software is based on the six basic emotions identified by Ekman (1970) and recognizes facial emotions such as joy and sadness. This highlights any discrepancy between the emotion reported and the emotion felt. Future studies could therefore assess the emotions expressed by the participants.

Even though the concepts of emotional dissonance and expressive dissonance can appear similar, they are nevertheless different. Unlike the definitions of emotional dissonance as put forward by organizational psychology theorists, who consider that emotional dissonance is partly based on organizational norms, expressive dissonance is based on a tension/tension reduction dynamic similar to cognitive dissonance, without needing to outline the existence of contextual organizational norms. From our point of view, the emotional regulation processes in play in expressive dissonance could enhance understanding of the phenomena of emotional dissonance.

To conclude, the induction of expressive dissonance is accompanied by cognitive processing leading to lower cognitive performances, emotional regulation strategies (exaggeration and suppression), and an increase of the self-directed negative affects, the latter are indicators of a state of internal tension. Considered together, our results argue in favor of the emergence of a new paradigm of dissonance exploring situations of the simultaneous management of opposing emotions. Based on the arousal of emotional inconsistency, it calls for the implementation of a dissonance reduction process. If, as we assume, expressive dissonance like cognitive dissonance is based on a tension/tension reduction dynamic, future studies will benefit from exploring the motivational dimension of this new paradigm, using, for example, the misattribution paradigm (Zanna and Cooper, 1976). Research carried out within this paradigm shows that when an individual attributes their state of internal tension (state of dissonance) to an external source of arousal, we no longer observe the expected effects of dissonance. According to the misattribution theorists, it appears that this external re-attribution has enabled the reduction of intrapsychic conflict.

Notes

¹ Data for the two studies are available at: https://osf.io/cwvpy/?view_only=005dc1f707684c76a002ab950e2503b7.

² Four items were excluded, either due to a low factor score (less than 0.65), or loading on several factors.

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Competing Interests

The authors have no competing interests to declare.

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