Imagined vicarious dissonance: induced-compliance on environmental behavior intention

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A. Background

1. Theoretical elements: imagined vicarious dissonance

Cognitive dissonance theory (CDT) is one of the most important theories in social psychology for more than 50 years (Devine & Brodish, 2003; Gawronski & Strack, 2012; Haggbloom et al., 2002). This area of research focuses on situations where individual actors are confronted with an inconsistency between two of their cognitions, causing an aversive state which they would be motivated to reduce. Although only a small number of studies have been conducted on cognitive dissonance in social groups compared to the extent of work available on cognitive dissonance (see Cooper & Stone, 2000 for a review), some of them indicate that dissonance can be influenced by an individual's membership of a particular social group. More recently, a new form of dissonance has been explored - vicarious dissonance - explicitly based on group membership. Norton et al. (2003) investigated the possibility that individuals may experience cognitive dissonance vicariously when they witness an inconsistent act committed by a member of their own group. Indeed, the observer would feel a state of uncomfortable arousal, which they would be motivated to reduce by changing their attitude about the action carried out by the observed person (see Jaubert et al., 2020 for a review).

Very recently, Cooper et al. (2018) designed a study as an extension of vicarious dissonance. The authors hypothesized that the mere mental representation of an ingroup member who acts inconsistently would be sufficient to generate vicarious dissonance. Specifically, simply imagining that an ingroup member would voluntarily engage in counter-attitudinal behavior would be necessary to generate vicarious dissonance. Imagined vicarious dissonance work, just like personal dissonance work, has important practical implications, particularly in attitudes and behavior change in the areas of health (Axsom & Cooper, 1985; Stone, 2011), environmental protection (Dickerson et al., 1992; Focella & Stone, 2014), road safety (Fointiat, 2004; Fointiat et al., 2001), and racial prejudice (Son-Hing et al., 2002). Indeed, while personal cognitive dissonance procedures appear to be effective (*e.g.,* Priolo et al., 2019), they nevertheless require costly efforts for the target individuals performing the tasks producing the dissonance (Focella et al., 2016). Such costs may not be viable, particularly in the context of prevention campaigns aimed at a wide audience at a lower cost. Vicarious dissonance responds to the limitations of personal dissonance procedures, by providing a particularly effective means of influencing attitude and behavior change, which can reach larger, geographically dispersed audiences (Cooper, 2019; Focella et al., 2016).

Despite the theoretical and practical interest that the imagined vicarious dissonance (IVD) may present, the recent replication crisis has questioned the credibility of past findings due to several methodological issues, particularly in terms of researcher degrees of freedom (Simmons et al., 2011) or low statistical power (Maxwell et al., 2015). These concerns about the replicability of prior findings (Vaidis & Bran, 2019) concern also apply to IVD. **Thus, our study described in the current report is a close replication of Cooper et al. (2018) and has a clear goal: to conduct a critical test of IVD in the French context, by conducting a preregistered replication.**

2. Choice of study for replication

A direct replication would not be relevant because the theme of Copper's study does not fit the French context (Republicans' and Democrats' attitudes towards Obamacare, Affordable Care Act). Thus, a constructive replication (*i.e.,* close to an original study, but with new elements to overcome methodological limitations; Hüffmeier et al., 2016; Nosek & Errington, 2020) seems better than direct replication.

Reflections from our review of the vicarious dissonance literature (Jaubert et al., 2020) led us to select a study performed by Cooper et al. (2018). Their experimentation was conducted to study the reaction of individuals when they imagine members of important groups engage in inconsistent behavior. This study was testing the prediction that participants will experience vicarious dissonance when they imagine an ingroup member make a counter-attitudinal speech, provided that the imagined behavior was engaged in voluntarily. In their study, participants Democrat or Republican participants who imagine a member of their respective political group voluntarily making a counter-attitudinal speech towards the Affordable Care Act (ACA) will be more likely to adjust their own attitudes towards the ACA, compared to those who imagine that actors have no choice. Thus, the authors hypothesized that, under a condition of free choice, Democrats would show less favorable attitudes towards the ACA than those under the condition of low choice. Republicans, on the other hand, in a condition of free choice, would show more favorable attitudes towards the ACA than those in the condition of low choice. 120 participants (36 participants identified as Republican and 84 as Democrats) were randomly assigned to one of two conditions: ingroup imagined speaker condition/outgroup speaker condition. The authors were testing the prediction that an imagined vicarious dissonance procedure would be able to influence the attitudes of citizens of different political persuasions (*i.e.,* Democrats and Republicans) towards the ACA. Participants' attitude was assessed immediately after the experimental procedure. Consistent with CDT, the results indicated a significant interaction between the choice and the political party. These results, therefore, support the idea that simply imagining that an ingroup member voluntarily engages in a counter-attitudinal behavior would be able to generate vicarious dissonance, which could lead to a change in attitude in favor of the counter-attitudinal measure.

Nevertheless, it seems important to specify that this study includes a small sample (n=18 for Republicans and 42 for Democrats per analysis cell). The effect size calculation of the original study effects indicates a small/medium effect size (eta-squared = 0.043, 90% CI [0.003, 0.121], see Table 1), consistent with effect sizes found in meta-analyses on the mean effect size in social psychology (*d* = 0.43, Richard et al., 2003; d = 0.30, Schäfer & Schwarz, 2019) and vicarious dissonance (h= 0.44; Jaubert et al., 2021).

Table 1. Summary of original findings in the target article

Factors	Effect	CIL	CIH
Effect 1: Attitude according to political party	0.484	0.367	0.585
Main effect: Attitude according to political party and choice	0.043	0.003	0.212
Effect 2: For Republican's participants, attitude according to choice	0.050	0.005	0.131
Effect 3: For Democrat's participants, attitude according to choice	0.028	0	0.096

Note. Effect 1 and main effect: the authors conducted a 2 (Democrat *versus* Republican) x 2 (high choice *versus* low choice) ANOVA on participants' attitudes towards the ACA. Main effect 2 and 3: analysis of simple effects of the 2 (Democrat *versus* Republican) x 2 (high choice *versus* low choice) ANOVA. Effect = eta-squared. CIL = lower bounds for CIs. CIH = higher bounds of CIs (90%)

We chose the Cooper et al. (2018) study based on two main factors: relevance of the study and validation and advance theory. Study of Cooper et al. (2018) is the only one to study IVD. Its replication will allow us to test the primary hypotheses that this theory offers us, as well as to validate and advance the theory.

We aimed to revisit the IVD phenomenon to examine the reproducibility and replicability of the findings with independent replications. Following the recent growing recognition of the importance of reproducibility and replicability in psychological science (*e.g.,* Brandt et al., 2014; Open Science Collaboration, 2015; van't Veer & Giner-Sorolla, 2016; Zwaan et al., 2018), we therefore embarked on a preregistered replication of Cooper et al. (2018).

B. Hypotheses

1. Description of essential elements

a. Describe the (numbered) hypotheses in terms of directional relationships between your (manipulated or measured) variables.

The main objective of this study will replicate the original findings by Cooper et al. (2018) in a French context. Thus, and because of the results obtained by the authors, we expect that imagining an ingroup member acting counterattitudinally (*i.e.,* not supporting pro-environmental behaviors) can influence the attitudes of participants, provided that the imagined behavior was engaged in voluntarily. More specifically, we expect that environmentally friendly people will show a less favorable attitude toward buying organic products when they imagine ingroup member acting counterattitudinally, contrary to participants who don't imagine an ingroup member acting counter-attitudinally (**H1, confirmatory hypothesis).**

Also, based on the results obtained by Cooper et al. (2018), we expect that imagining an ingroup member acting counterattitudinally (*i.e.,* not supporting pro-environmental behaviors) can influence participants' perceptions of their own group identification. More specifically, we expect that environmentally friendly people who imagine ingroup member acting counterattitudinally will report a less strong identification compared to that participant who don't imagine an ingroup member acting counter-attitudinally **(H2, confirmatory hypothesis).**

In addition, in agreement with the results obtained by Cooper et al. (2018), we expect that imagining an ingroup member acting counterattitudinally (*i.e.,* not supporting pro-environmental behaviors) don't influence participants' perceptions of their similarity to their friend, and friend's typicality and identification with their political party. More specifically, we expect that environmentally friendly people who imagine ingroup member acting counterattitudinally will report the same similarity, typicality and identification to their friend compared to that participant who don't imagine an ingroup member acting counter-attitudinally **(H3, confirmatory hypothesis).**

b. For interaction effects, describe the expected shape of the interactions.

We aimed to extend the replication study by considering the effect of identification on attitude as a function of the imagined vicarious dissonance (presence/absence). Thus, we expect that imagining an ingroup member acting counterattitudinally (*i.e.,* not supporting pro-environmental behaviors) can influence the attitudes of participants, provided that the imagined behavior was engaged in voluntarily, especially when they are highly identified with the ingroup. More specifically, we expect that environmentally friendly people will show less favorable attitude toward intentions to buy organic products when they imagine ingroup member acting counterattitudinally contrary to participants who don't imagine an ingroup member acting counter-attitudinally, especially when the participant is highly identified to the ingroup (**H4, extension hypothesis).**

The second extension concerns the effect of issue-importance on attitude as a function of the imagined vicarious dissonance (presence/absence; Starzyk et al., 2009). Thus, we expect that imagining an ingroup member acting counterattitudinally (*i.e.,* not supporting pro-environmental behaviors) can influence the attitudes of participants, provided that the imagined behavior was engaged in voluntarily, especially when the issue was personally important. More specifically, we expect that environmentally friendly people will show less favorable attitude toward intentions to buy organic products when they imagine ingroup member acting counterattitudinally contrary to participants who don't imagine an ingroup member acting counter-attitudinally, especially when the participant attaches importance to environmental issues (**H5, extension hypothesis).**

c. If you are manipulating a variable, make predictions for unsuccessful check variables or explain why no manipulation check is included.

N-A

C. Methods

1. Description of essential elements (required)

a. Design

i. Independent variables with all their levels

IV: Imagined vicarious dissonance (IVD; presence/absence), between-subject factor.

ii. List dependent variables, or variables in a correlational design

The main dependent variable will be the environmental behavioral intentions, obtained from a pre-test, consists of two items:

1. The behavioral intention to buy organic products, were measured using "I intend to buy organic products" (7-point scale, 1 = never, 2 = very rarely, 3 = rarely, 4 = sometimes, 5 = often, 6 = very often, 7 = always);

2. The percentage of additional expenditure for these products, were measured using "In general, organic products can be more expensive. If you were willing to buy organic products, how much more money would you be willing to spend on an identical product?" (12-point percentage scale, 0%; 10%; 20%; 30%; 40%; 50%; 60%; 70%; 80%; 90%; 100%; 100% and more).

To test hypotheses 2 and 3, we measure the participant's social identification on a group of environmentally friendly people, perceived similarity to their friend, friend's typicality, and identification with their political party:

1. ***Social identification*** with the participant's group will be measured in 1 item, "I strongly identify with the environmentally friendly people group" (1 = strongly disagree, 7 = strongly agree; Reysen et al., 2013).
2. ***The similarity*** to their friend will be measured in 4 items, "How do you feel similar to our friend in general", "...in terms of background", "...in terms of attitudes", and "...in terms of personal dispositions," (1 = not similar at all, 7 = very similar), adapted in French from the studies of Stephan et al. (2011);
3. **A friend's typicality** will be measured in 1 item: "How typical do you consider your friend to be of the group of environmentally friendly people ? "(1 = not at all typical, 7 = very typical), adapted in French from studies by Hogg et al. (1993);
4. **A friend's social identification** will be measured in 1 item, "My friend is strongly identify with the environmentally friendly people group" (1 = strongly disagree, 7 = strongly agree; Reysen et al., 2013).

i. Third variables acting as covariates or moderators.

We will measure the proximity with the group as a covariate. Our measure of proximity with the group consists of 2 measures: group prototypicality and interpersonal proximity:

1. The measure of prototypicality will be measured in 1 item: "How typical of the group of environmentally friendly people do you consider yourself to be ? "(1 = not at all typical, 7 = very typical), adapted in French from studies by Hogg et al. (1993).

2. The IOS scale (Aron et al., 1992) will measure interpersonal closeness to the environmentally friendly people group.

Also, we will measure the importance that participants attach to environmental issues. Our measure of importance consists of 3 items (Stern, 2000; Wakslak, 2012): "How important are environmental issues to you?", "How important is it to you to achieve pro-environmental behaviors on a daily basis?" and "What importance do you attach to purchasing practices that consider the environmental impact of production processes?" (1 = not at all important, 7 = very important).

b. Planned Sample

i. If applicable, describe pre-selection rules.

Participants will be students at Aix Marseille University, recruited in courses. Recruitment will take place until enough participants are recruited for the study.

ii. Indicate where, from whom and how the data will be collected.

The data will be collected in the course at Aix-Marseille University, through online and paper questionnaires (for students who do not have a computer).

iii. Justify planned sample size

Based on the effect size of the main effect found in Cooper et al. (2018), our analysis suggests that for a balanced one-way analysis of variance to detect an effect size of *eta* = 0.043 with .90 power, assuming alpha = .05, we need 117 subjects per group (234 in total).

iv. If applicable, you can upload a file related to your power analysis here (e.g., a protocol of power analyses from G*Power, a script, a screenshot, etc.).

See "Supplementary – IVD_SI" document.

v. Describe data collection termination rule.

As soon as we get 234 reliable data.

c. Exclusion Criteria

i. Describe anticipated specific data exclusion criteria. For example:

General criteria:

1. Participants who are not students at Aix-Marseille University at the time of the study;
2. Participants indicating a low proficiency of French (self-report < 6, on a 1-7 scale);
3. Participants who are an international student[1];
4. Participants who failed to complete the survey (leave question blank);
5. Participants who were disturbed during the data collection session for any specific reason (*e.g.,* phone interruption, alarm, computer crash);
6. Participants who have already seen or done the survey before (positive response to the question "Have you ever seen the materials used in this or a similar study?").

d. Procedure

After consenting to take part in the research, participants will complete the questionnaire. The questionnaire will be counted from the measures presented in "C. 1. a. Design" section above (see "Supplementary" document for complete questionnaire):

- The importance than participants attach to environmental issues (covariate 2);
- Proximity to the group (covariate 1).

Then, participants will be asked to think about a close friend of theirs who identifies strongly with an environmentally friendly person. Participants were instructed to indicate that friend's first name or their initials in the online form.

For the IVD induction, participants will read a short vignette in which their environmentally friendly friend—whom they named in the previous section—expressed a counter-attitudinal opinion. In the vignette, participants will be asked to imagine that they were witnessing their friend participate in an awareness day with other friends and community members. In this imagined debate, participants were told that there was a special "devil's advocate" round in which the friend will be asked (***presence of IVD,*** dissonance-arousing) to formulate an argument against the position of his or her own group. Specifically, participants will be asked to imagine their environmentally friendly friend express an argument against the importance of buying products from organic agriculture.

[1] As a social event, vicarious dissonance is a culturally determined phenomenon, which can manifest itself in different ways depending on the cultural context in which it is studied (Chong et Cooper, 2007). It is therefore important to control the country of origin of the participants. Furthermore, since our objective is to study the vicarious dissonance process in a French context, international students will be excluded.

For the control condition (absence of IVD), participants will read a short vignette in which their environmentally friendly friend will be asked to formulate suggestions for additional topics concerning pro-environmental policies that require the attention of future committees to the association.

At last, participants will complete the dependent measures, exploratory measures, as well as the demographic and measure check variables:

- environmental behavioral intentions (dependent variable, two items; see "C. 1. a. Design " section above);
- social identification (exploratory measure) ;
- perceived similarity to their friend (exploratory measure) ;
- demographics measures.

5. Recommended elements

a. Procedure

i. Set fail-safe levels of exclusion at which the whole study needs to be stopped, altered, and restarted. You may pre-determine what proportion of excluded participants will cause the study to be stopped and restarted.

We will provide participants with the opportunity to withdraw from the study after completing the questionnaire.

ii. If applicable, you can upload any files related to your methods and procedures here (e.g., a paper describing a scale you are using, experimenter instructions, etc.)

See “Supplementary – IVD_SI” document.

D. Analysis Plan

1. Confirmatory Analyses (required)

a. Describe the analyses that will test the first main prediction from the hypotheses section. Include:

i. The relevant variables and how they are calculated;

IV: imagined vicarious dissonance (presence/absence), between-subject factor. The number "1" will be assigned to participants in the presence of IVD condition, and the number "0" will be assigned to participants in the absence of IVD condition.

DV: behavioral intention to buy organic products and percentage of additional expenditure for these products. Participants will indicate their behavioral intention to buy organic products on a scale of 1 to 7, and their percentage of additional expenditure for these products on a scale of 1 to 12.

ii. The statistical technique

To test H1, we will perform a unilateral (DV on presence of IVD < DV on absence of IVD) Independent Sample T-Test with:

- ***Grouping variable:*** imagined vicarious dissonance (presence/absence);
- ***Dependent variable:*** behavioral intention to buy organic products and percentage of additional expenditure for these products.

iii. Each variable's role in the technique (e.g., IV, DV, moderator, mediator, covariate);

IV: imagined vicarious dissonance (presence/absence), between-subject factor.
DV**:** behavioral intention to buy organic products and percentage of additional expenditure for these products.

iv. Rationale for each covariate used, if any;

N-A

v. If using techniques other than null hypothesis testing (for example, Bayesian statistics), describe your criteria and inputs toward making an evidential conclusion, including prior values or distributions.

N-A

2. **Second Prediction (optional)**

a. Describe the analyses that will test the second main prediction from the hypotheses section. Include:

i. The relevant variables and how they are calculated;

IV: imagined vicarious dissonance (presence/absence), between-subject factor. The number "1" will be assigned to participants in the presence of IVD condition, and the number "0" will be assigned to participants in the absence of IVD condition.

DV: social identification. Participants will indicate their social identification to the group on a scale of 1 to 7.

ii. The statistical technique;

To test H2, we will perform a unilateral (DV on presence of IVD < DV on absence of IVD) Independent Sample T-Test with:

- ***Grouping variable:*** imagined vicarious dissonance (presence/absence);
- ***Dependent variable:*** social identification.

iii. Each variable's role in the technique (e.g., IV, DV, moderator, mediator, covariate);

IV: imagined vicarious dissonance (presence/absence), between-subject factor.
DV: social identification**.**

iv. Rationale for each covariate used, if any;

N-A

v. If using techniques other than null hypothesis testing (for example, Bayesian statistics), describe your criteria and inputs toward making an evidential conclusion, including prior values or distributions.

N-A

3. **Third Prediction (optional)**

a. Describe the analyses that will test the second main prediction from the hypotheses section. Include:

i. The relevant variables and how they are calculated;

IV: imagined vicarious dissonance (presence/absence), between-subject factor. The number "1" will be assigned to participants in the presence of IVD condition, and the number "0" will be assigned to participants in the absence of IVD condition.

DV:

- ***similarity to their friend.*** Participants will indicate their similarity to their friend on a scale of 1 to 7;
- **friend's typicality.** Participants will indicate their perceived friend's typicality on a scale of 1 to 7;
- **Friend's social identification** Participants will indicate their perceived friend's identification on a scale of 1 to 7.

ii. The statistical technique;

To test H3, we will perform 3 bilateral Independent Sample T-Test with:

- *Grouping variable:* imagined vicarious dissonance (presence/absence);

- *Dependent variable*: similarity to their friend, friend's typicality and identification.

iii. Each variable's role in the technique (e.g., IV, DV, moderator, mediator, covariate);

IV: imagined vicarious dissonance (presence/absence), between-subject factor.
DV: similarity to their friend, friend's typicality and identification.

iv. Rationale for each covariate used, if any;

N-A

v. If using techniques other than null hypothesis testing (for example, Bayesian statistics), describe your criteria and inputs toward making an evidential conclusion, including prior values or distributions.

4. **Four Prediction (optional)**

a. Describe the analyses that will test the second main prediction from the hypotheses section. Include:

i. The relevant variables and how they are calculated;

IV: imagined vicarious dissonance (presence/absence), between-subject factor. The number "1" will be assigned to participants in the presence of IVD condition, and the number "0" will be assigned to participants in the absence of IVD condition.

Covariate: social identification with the group. It will be measured in 1 item, "I strongly identify with the environmentally friendly people group" (1 = strongly disagree, 7 = strongly agree; Reysen et al., 2013).

DV: behavioral intention to buy organic products and percentage of additional expenditure for these products. Participants will indicate their behavioral intention to buy organic products on a scale of 1 to 7, and their percentage of additional expenditure for these products on a scale of 1 to 12.

ii. The statistical technique;

To test H4, we will perform two ANCOVA with:

- ***Fixed Factor:*** imagined vicarious dissonance (presence/absence);
- ***Covariate:*** social identification with the group;
- ***Dependent variable:*** behavioral intention to buy organic products and percentage of additional expenditure for these products.

iii. Each variable's role in the technique (e.g., IV, DV, moderator, mediator, covariate);

IV: imagined vicarious dissonance (presence/absence), between-subject factor.
Covariate: social identification with the group;
DV: behavioral intention to buy organic products and percentage of additional expenditure for these products.

iv. Rationale for each covariate used, if any;

N-A

v. If using techniques other than null hypothesis testing (for example, Bayesian statistics), describe your criteria and inputs toward making an evidential conclusion, including prior values or distributions.

5. **Five Prediction (optional)**

a. Describe the analyses that will test the second main prediction from the hypotheses section. Include:

i. The relevant variables and how they are calculated;

IV: imagined vicarious dissonance (presence/absence), between-subject factor. The number "1" will be assigned to participants in the presence of IVD condition, and the number "0" will be assigned to participants in the absence of IVD condition.

Covariate: importance to environmental issues. We will take the mean of the three items to create a single measure of "importance". We will therefore obtain, for each participant, a score of "importance" on a scale of 1 to 7.

DV: behavioral intention to buy organic products and percentage of additional expenditure for these products. Participants will indicate their behavioral intention to buy organic products on a scale of 1 to 7, and their percentage of additional expenditure for these products on a scale of 1 to 12.

ii. The statistical technique;

To test H5, we will perform two ANCOVA with:

- ***Fixed Factor:*** imagined vicarious dissonance (presence/absence);
- ***Covariate:*** importance;
- ***Dependent variable:*** behavioral intention to buy organic products and percentage of additional expenditure for these products.

iii. Each variable's role in the technique (e.g., IV, DV, moderator, mediator, covariate);

IV: imagined vicarious dissonance (presence/absence), between-subject factor.
Covariate: importance;
DV: behavioral intention to buy organic products and percentage of additional expenditure for these products.

iv. Rationale for each covariate used, if any;

N-A

v. If using techniques other than null hypothesis testing (for example, Bayesian statistics), describe your criteria and inputs toward making an evidential conclusion, including prior values or distributions.

6. Recommended Elements (optional)

a. Specify contingencies and assumptions, such as:

i. Methods of correction for multiple tests.

We will use the standard $p<.05$ criteria for determining if the T-test, ANCOVA, and the post hoc test suggest that the results are significantly different from those expected if the null hypothesis was correct. We will report the post-hoc tests with Tukey and Bonferroni corrections.

ii. The method of missing data handling (e.g., pairwise or listwise deletion, imputation, interpolation).

For questionnaires completed online, participants are required to fill in the requested information to continue the experiment. Uncompleted paper questionnaires will not be considered.

iii. Reliability criteria for item inclusion in scale.

N-A

iv. Anticipated data transformations.

N-A

v. Assumptions of analyses, and plans for alternative/corrected analyses if each assumption is violated.

More robust models will be carried out in case of non-normality and/or non-homoscedasticity.

vi. Optionally, upload any files here that are related to your analyses (e.g., syntaxes, scripts, etc.).

E. Final Questions

1. **Has data collection begun for this project? (required)**

    a. **Please choose:**

        i. No, data collection has not begun
        ~~ii. Yes, data collection is underway or complete.~~

2. **If data collection has begun, have you looked at the data? (required)**

    a. **Please choose:**

        ~~i. Yes~~
        ii. No

3. **The (estimated) start and end dates for this project are: (optional)**

Data collection date: 20/09/2021 to 08/10/2021

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